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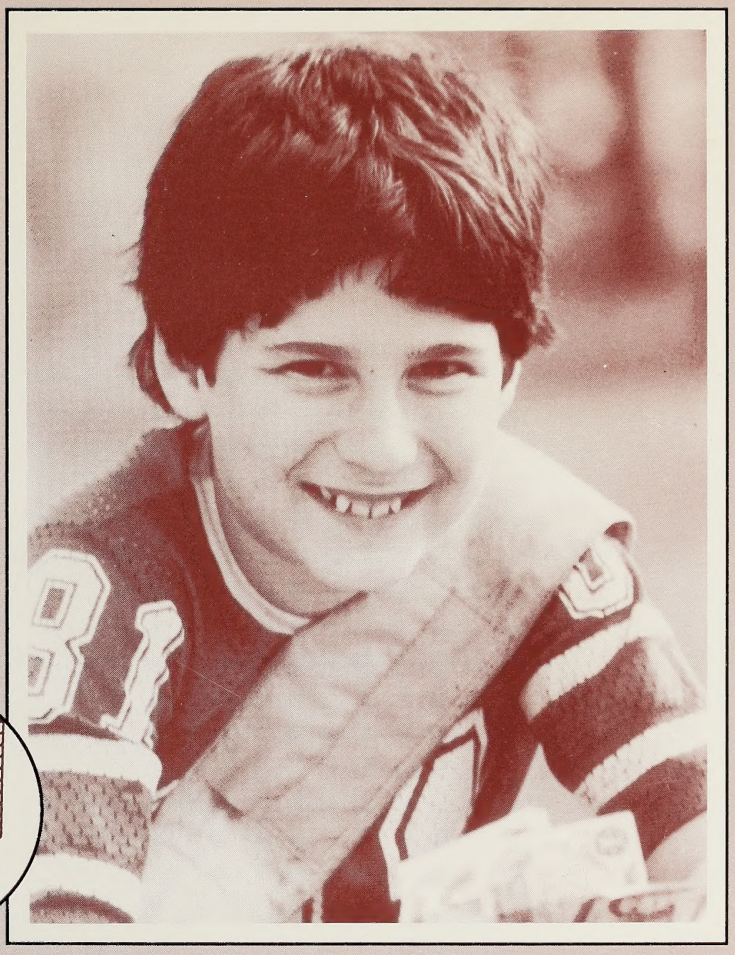
MODULE 3

LEARNING AIDS
BOOKLET



# MATHEMATICS 7

Distance Learning

Alberta
EDUCATION

CANADIANA
AUG 8 1991

# Mathematics 7

# Module 3

# Fractions and Decimals

# LEARNING AIDS BOOKLET

Mathematics 7
Learning Aids Booklet
Module 3
Fractions and Decimals
Alberta Distance Learning Centre
ISBN No. 0-7741-0152-0

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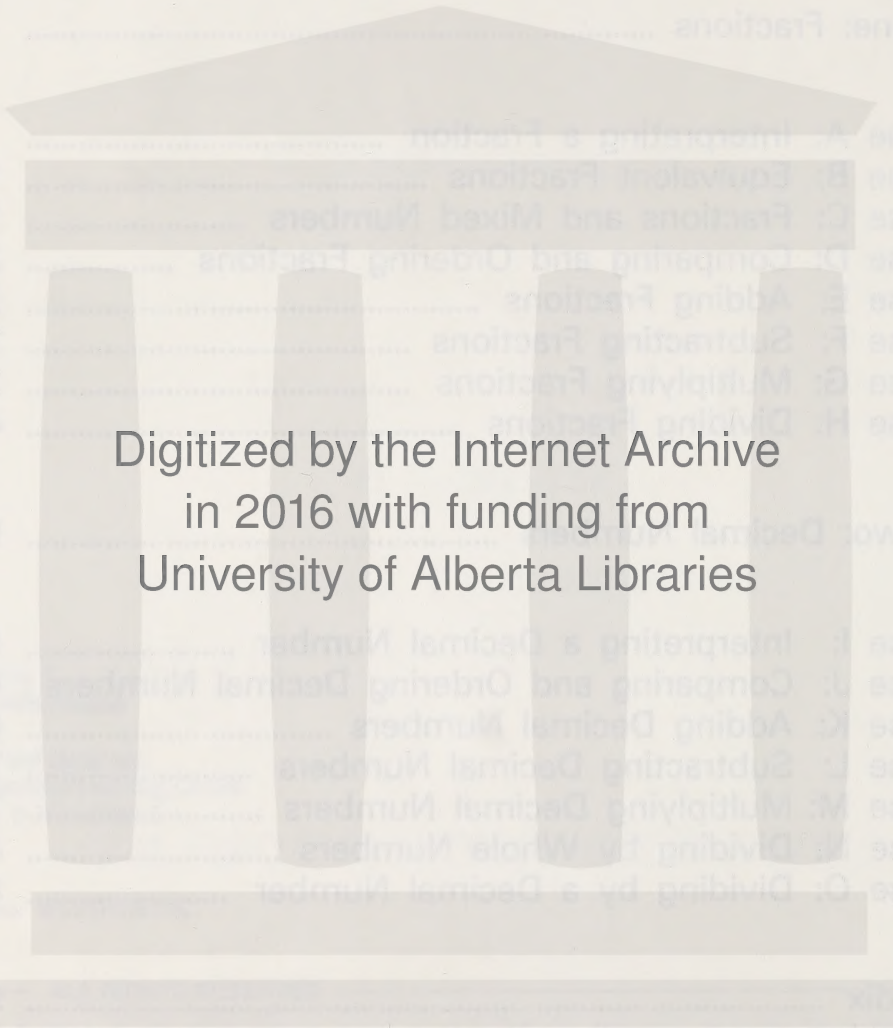

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# Part One

# Fractions

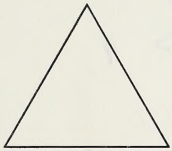
# Part One

# Fractions

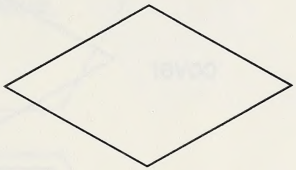
# INTERPRETING A FRACTION

## Exercise A

All of the activities in this part of the booklet use these pattern blocks to represent fractions:

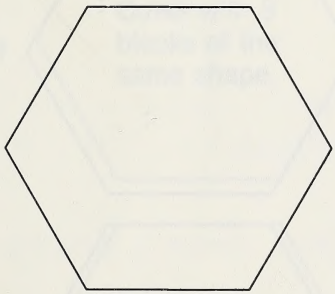


TRIANGLE



PARALLELOGRAM

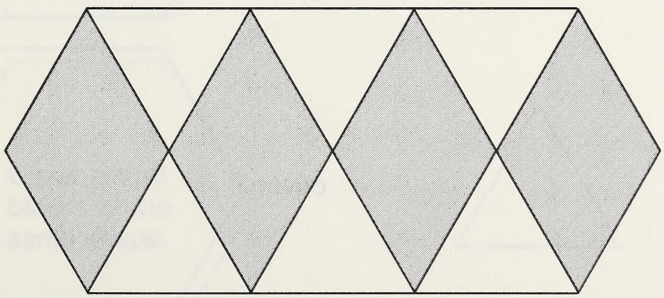
TRAPEZOID



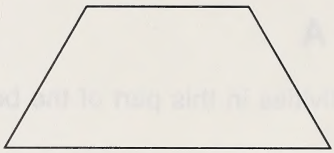
HEXAGON

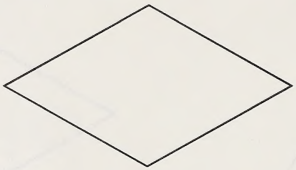
SQUARE

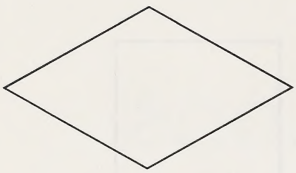
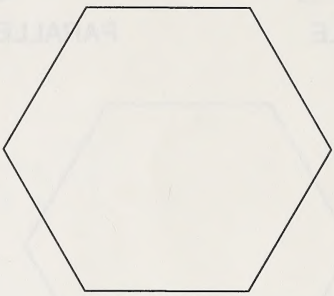
Pattern blocks may be combined to make many different figures. Here is one example.

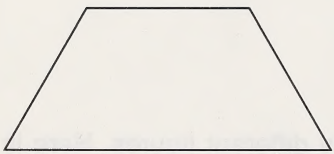


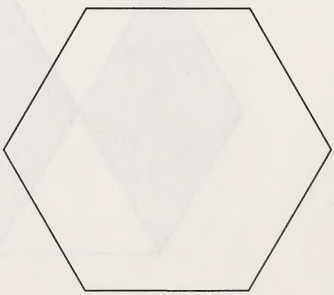
1. Explore the relationship between the blocks.

a. How many cover  ?

b. How many cover  ?

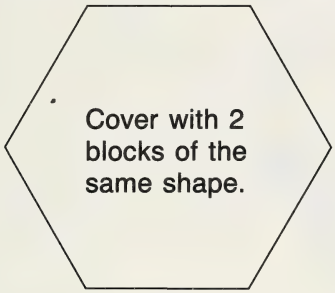
c. How many  cover  ?

d. How many  cover ?

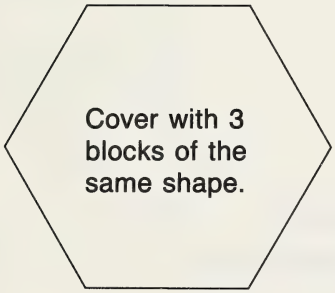
e. How many cover  ?

2. Which shape of pattern blocks do you need to cover each hexagon with the following number of blocks?

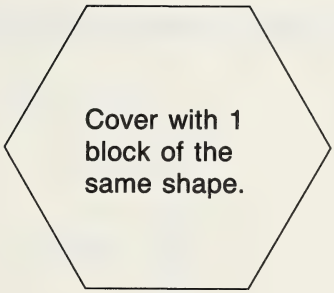
a.



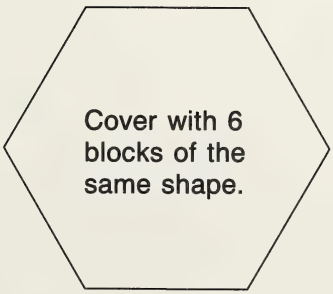

b.



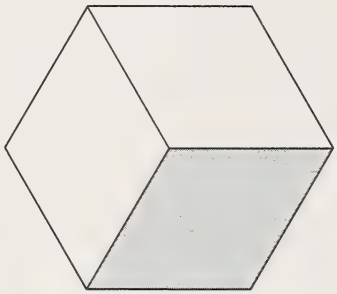

c.




d.



A fraction may describe a part of a whole.



One parallelogram covers the shaded part.

Three parallelograms cover this whole figure.

One-third ( $\frac{1}{3}$ ) is shaded.

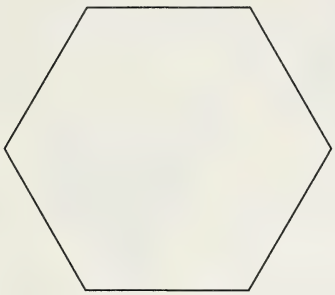
$\frac{1}{3}$ ← number of triangles covering the shaded part
← total number of triangles covering the whole figure

In a fraction the top is called the numerator and the bottom number is called the denominator.

$\frac{1}{3}$ ← NUMERATOR
← DENOMINATOR

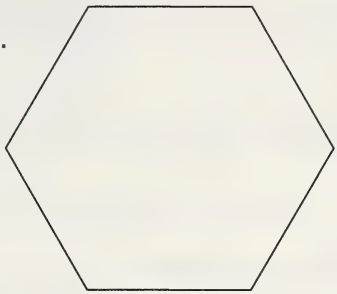
3. Cover the following figures with the appropriate number of pattern blocks. Trace your blocks and shade to show each fraction.

a.



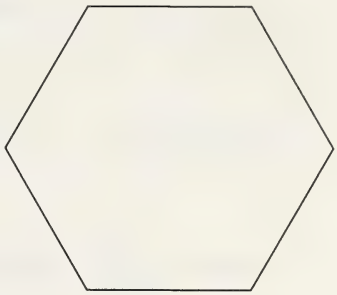
one-half $\left(\frac{1}{2}\right)$

b.



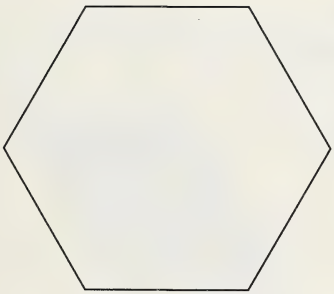
one-third $\left(\frac{1}{3}\right)$

c.



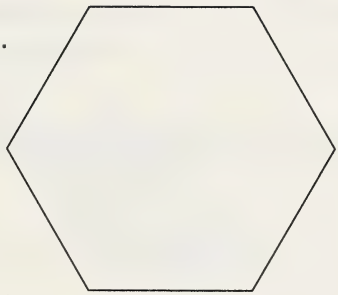
two-thirds $\left(\frac{2}{3}\right)$

d.



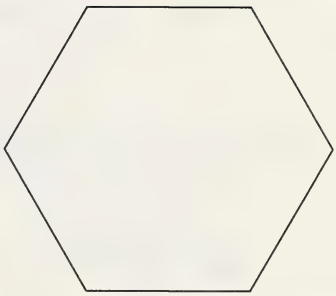
two-halves $\left(\frac{2}{2}\right)$

e.



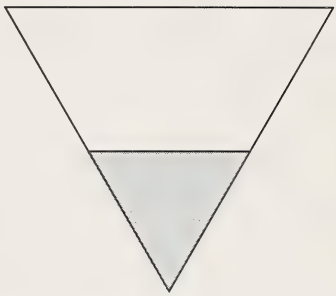
one-sixth $\left(\frac{1}{6}\right)$

f.



five-sixths $\left(\frac{5}{6}\right)$

4. Cover the whole figure with triangles.

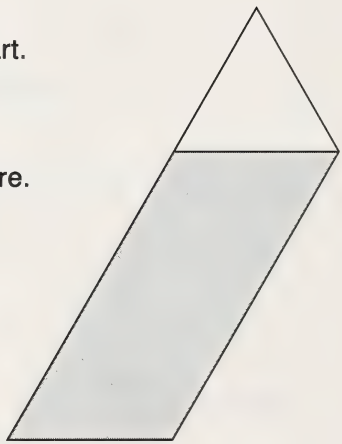


a. It takes _____ triangles to cover the shaded part.

b. It takes _____ triangles to cover the whole figure.

c. What fraction of the figure is shaded?

5. Cover the whole figure with squares.



a. It takes _____ triangles to cover the shaded part.

b. It takes _____ triangles to cover the whole figure.

c. What fraction of the figure is shaded?

6. Cover the whole figure with triangles.

a. It takes _____ triangles to cover the shaded part.

b. It takes _____ triangles to cover the whole figure.

c. What fraction of the figure is shaded?

7. Cover the whole figure with parallelograms.

a. It takes _____ parallelograms to cover the shaded parts.

b. It takes _____ parallelograms to cover the whole figure.

c. What fraction of the whole figure is shaded?

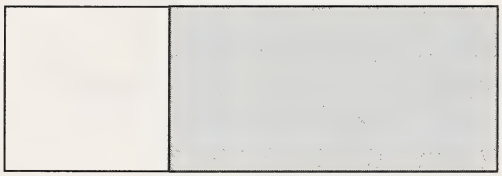
8. Cover the shaded fraction of each figure with squares.

a. What fraction of the figure is shaded?

b. What fraction of the figure is not shaded?

c. What fraction of the figure is shaded?

d. What fraction of the figure is not shaded?



e. What fraction of the figure is shaded?

f. What fraction of the figure is not shaded?

g. What fraction of the figure is shaded?

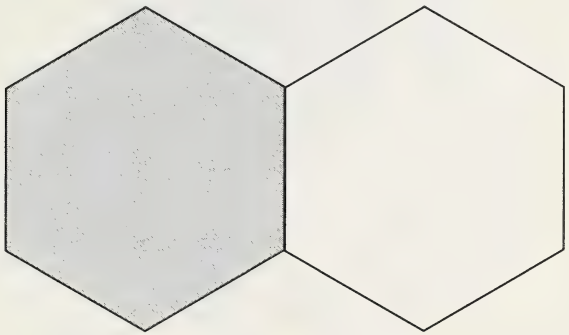
h. What fraction of the figure is not shaded?

Return to your Module Booklet.

# EQUIVALENT FRACTIONS

## Exercise B

1. Use the figure below to find several different names for the shaded part of this whole figure.



**Example**

You can cover this figure with twelve triangles. You can cover the shaded part of the figure with six triangles. So $\frac{6}{12}$ of the triangle is shaded?

a. Covering with parallelograms, what fraction is shaded?

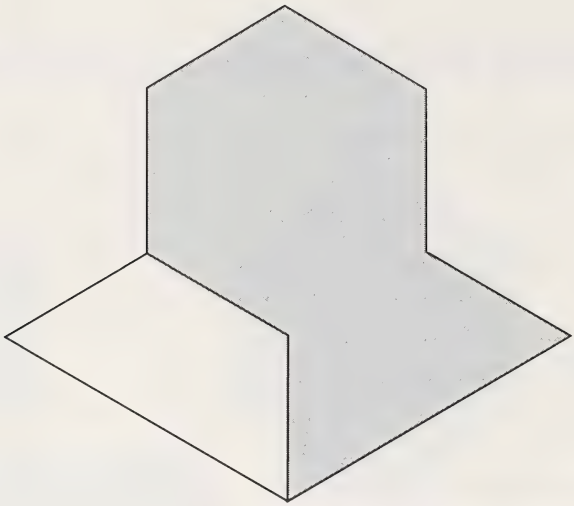
b. Covering with trapezoids, what fraction is shaded?

c. Covering with hexagons, what fraction is shaded?

Figures which are the same part of a whole are called equivalent fractions.

$\frac{6}{12}$, $\frac{3}{6}$, $\frac{2}{4}$ and $\frac{1}{2}$ are equivalent fractions.

2. What fraction of the figure is shaded?

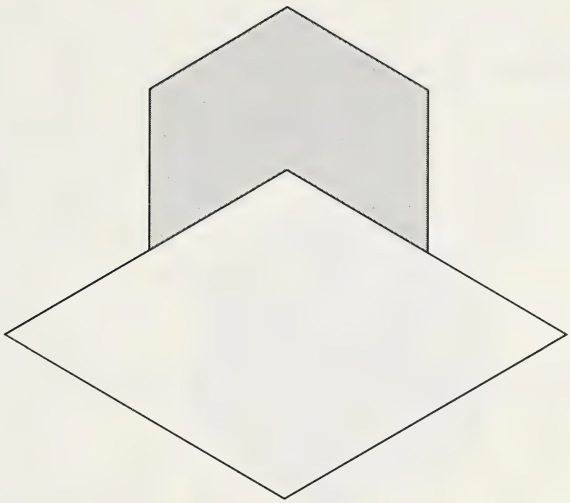


a. Covering with trapezoids, what fraction is shaded?

b. Covering with triangles, what fraction is shaded?

c. Name the equivalent fractions.

3. What fraction of the figure is shaded?



a. Covering with triangles, what fraction is shaded?

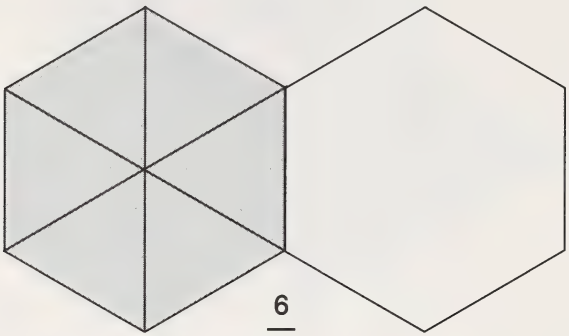
b. Covering with parallelograms, what fraction is shaded?

c. Name the equivalent fractions.

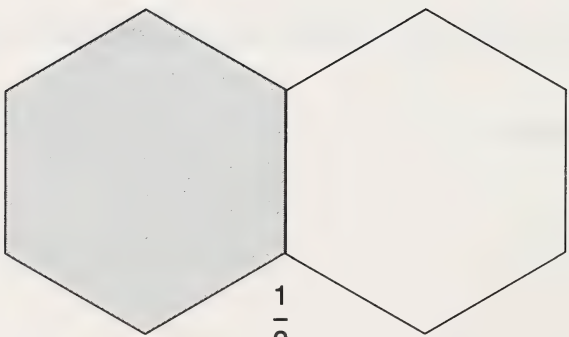
To simplify a fraction represent it with the fewest pattern blocks of one shape.

**Example**

Which is the simpler form, $\frac{6}{12}$ or $\frac{1}{2}$?

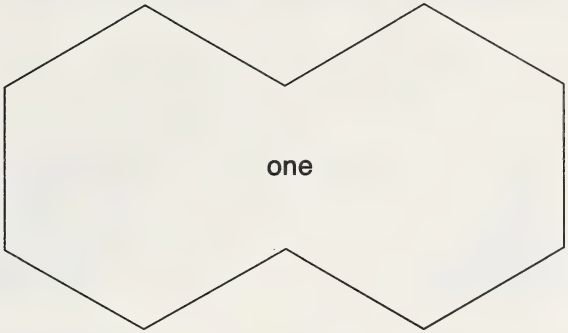


$\frac{6}{12}$



← simplest form

$\frac{1}{2}$




4. What is the simpler form for each of the following. Use pattern blocks to check.

a. $\frac{3}{12}$ or $\frac{1}{4}$

b. $\frac{10}{12}$ or $\frac{5}{6}$

c. $\frac{2}{3}$ or $\frac{4}{6}$

d. $\frac{6}{7}$ or $\frac{12}{14}$

e. $\frac{3}{4}$ or $\frac{6}{8}$

f. $\frac{4}{10}$ or $\frac{2}{5}$

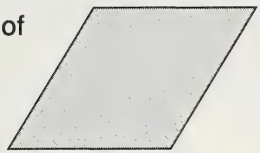
5. What pattern do you notice about the simpler forms?

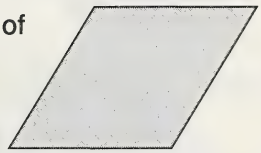
Return to your Module Booklet.

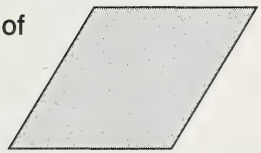
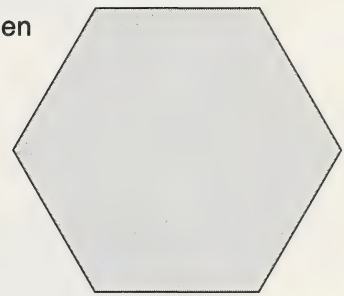
# FRACTIONS AND MIXED NUMBERS

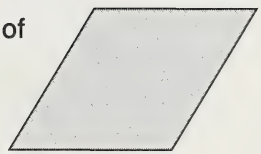
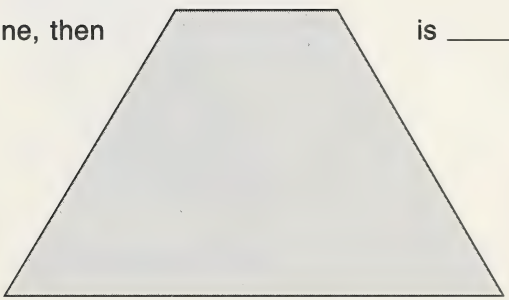
## Exercise C

1. Use pattern blocks to solve these problems.

a. If the value of  is one, then is _____.

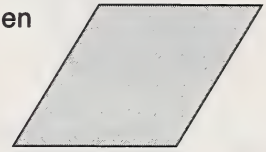
b. If the value of  is one, then is _____.

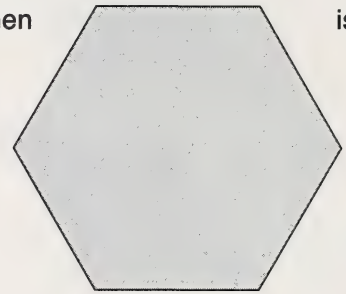
c. If the value of  is one, then  is _____.

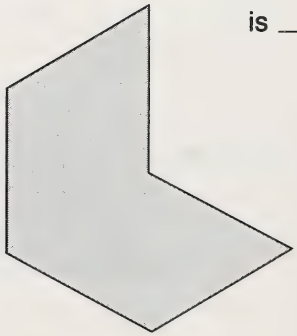
d. If the value of  is one, then  is _____.

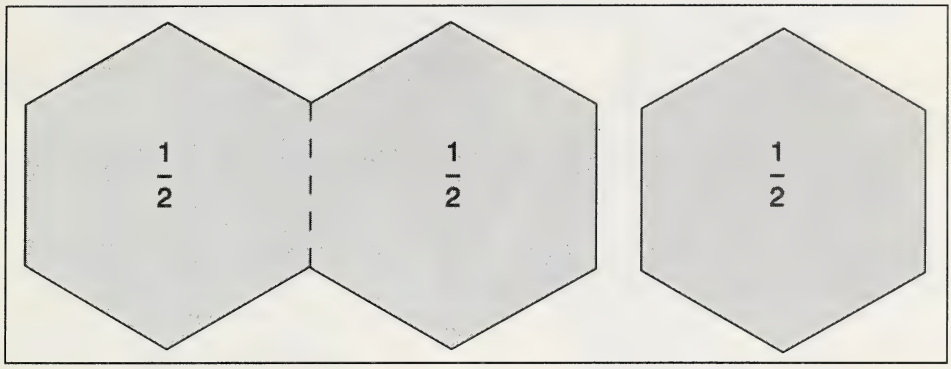
2. Use pattern blocks to solve these problems.

a. If the value of is one, then is _____ .

b. If the value of is one, then  is _____ .

c. If the value of is one, then  is _____ .

d. If the value of is one, then  is _____ .



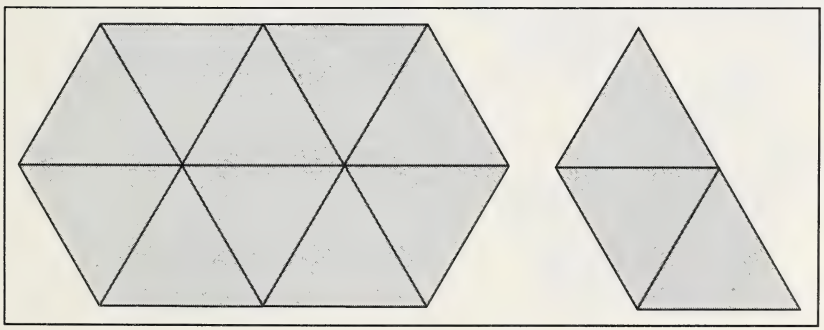

This is a model for $1\frac{1}{2}$

1 and 1 half is the same as 3 halves.

$$1\frac{1}{2} = \frac{3}{2}$$

Use pattern blocks to name each of these models as a mixed number and as an improper fraction.

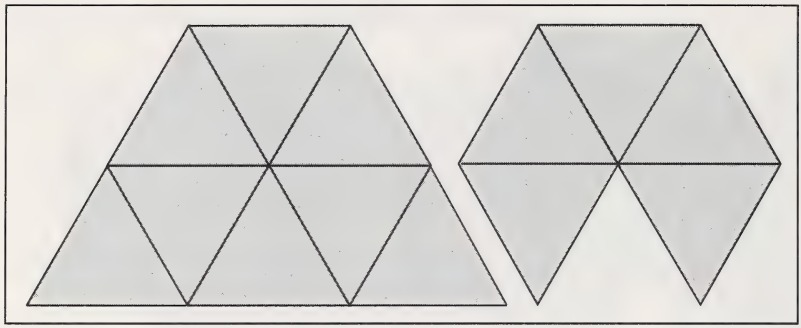
3.



a. Mixed Number

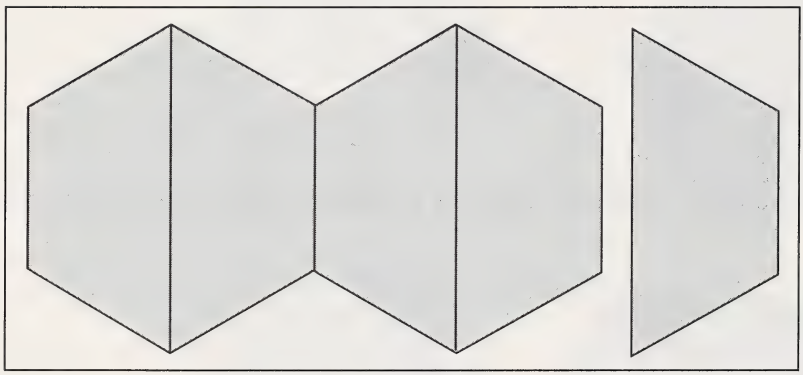
b. Improper Fraction

4.



a. Mixed Number b. Improper Fraction

5.



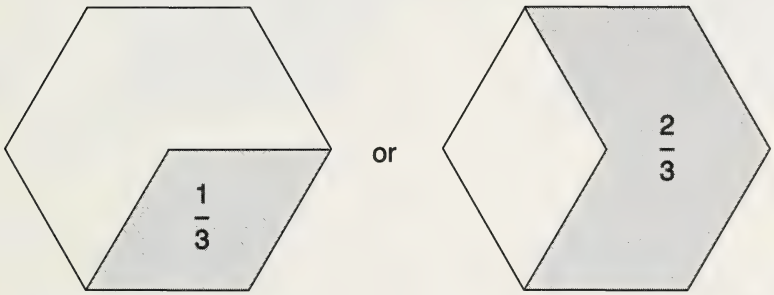
a. Mixed Number b. Improper Fraction

Return to your Module Booklet.

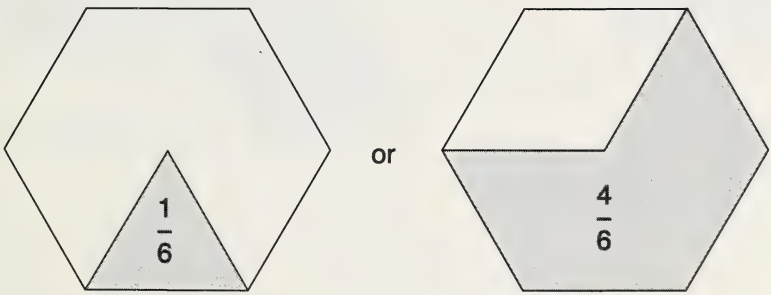
# COMPARING AND ORDERING FRACTIONS

## Exercise D

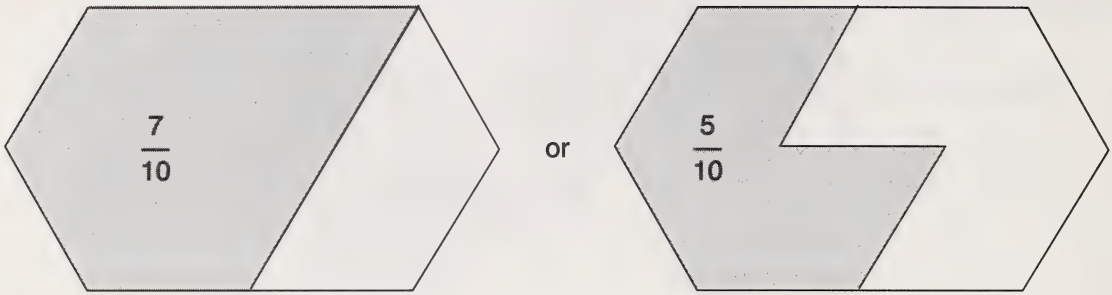
1. a. Which is more, $\frac{1}{3}$ or $\frac{2}{3}$?




b. Which is more, $\frac{1}{6}$ or $\frac{4}{6}$?

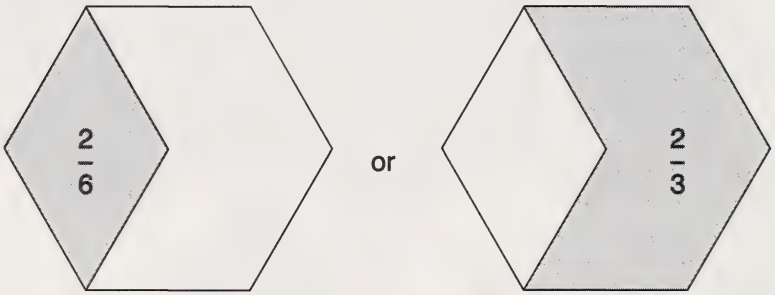


c. Which is more, $\frac{7}{10}$ or $\frac{5}{10}$ ?

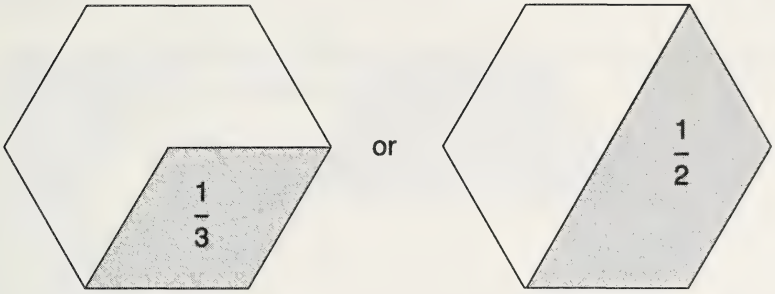



d. What pattern do you notice?

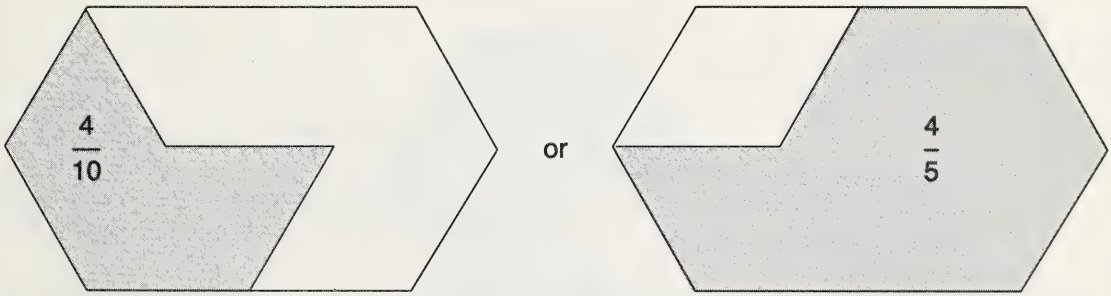
2. a. Which is more, $\frac{2}{6}$ or $\frac{2}{3}$ ?



b. Which is more, $\frac{1}{3}$ or $\frac{1}{2}$?

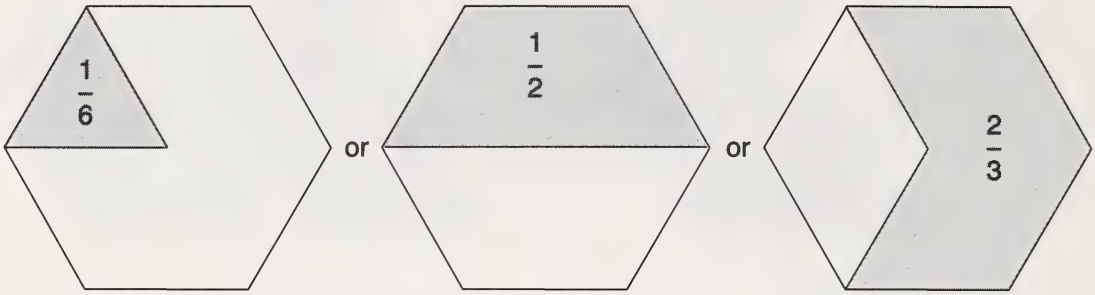



c. Which is more, $\frac{4}{10}$ or $\frac{4}{5}$?

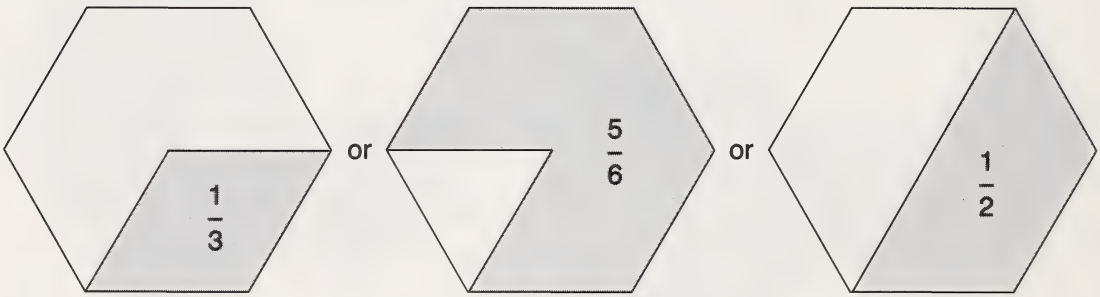



d. What pattern do you notice?

3. a. Which is more, $\frac{1}{6}$ or $\frac{1}{2}$ or $\frac{2}{3}$?




b. Which is more, $\frac{1}{3}$ or $\frac{5}{6}$ or $\frac{1}{2}$?

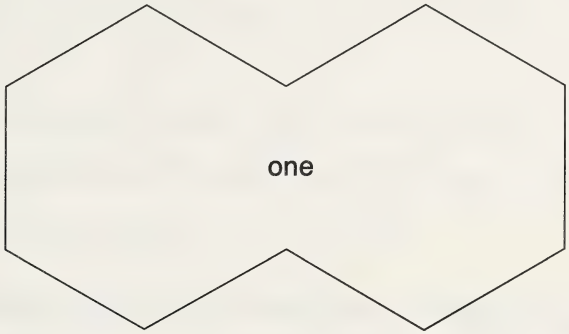



Return to your Module Booklet.

# ADDING FRACTIONS

## Exercise E

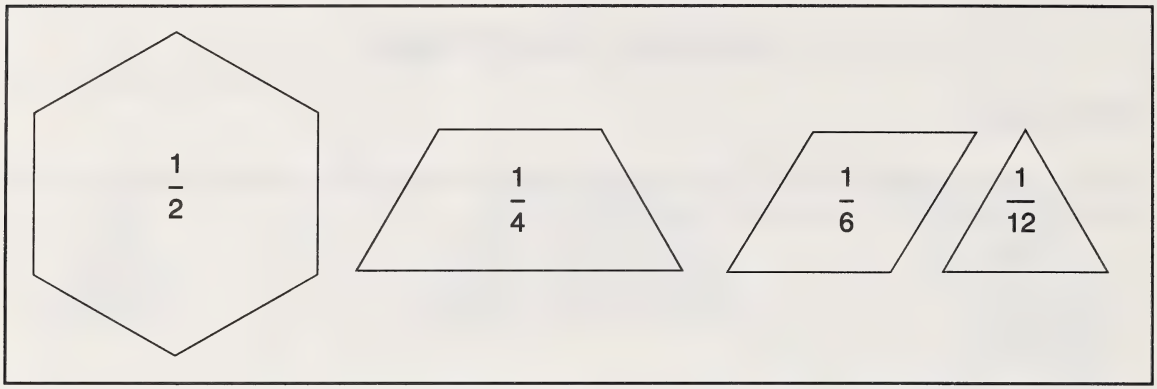
As you have discovered many different shapes can represent one whole. However, for this exercise this shape will represent one whole.




Addition involves combining parts.

It is easier to add fractions with common denominators. With pattern blocks you are putting together blocks of the same shape.

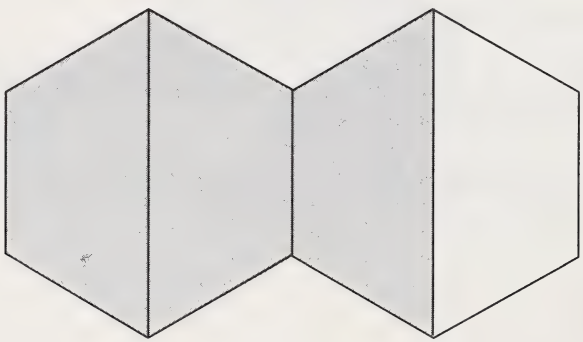
It is more difficult to add fractions that do not have common denominators. With pattern blocks you are combining blocks of different shapes.




**Example**

One trapezoid is $\frac{1}{4}$ of the whole. Two trapezoids is $\frac{2}{4}$ of the whole.

The sum of one trapezoid and two trapezoids is three trapezoids or $\frac{3}{4}$ of the whole.



So $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$

1. a. are _____ of the whole.

   b. are _____ of the whole.

   c. The sum of 2 parallelograms and 3 parallelograms is _____ parallelograms.

   d. This sum is _____ of the whole.

2. a. are _____ of the whole.

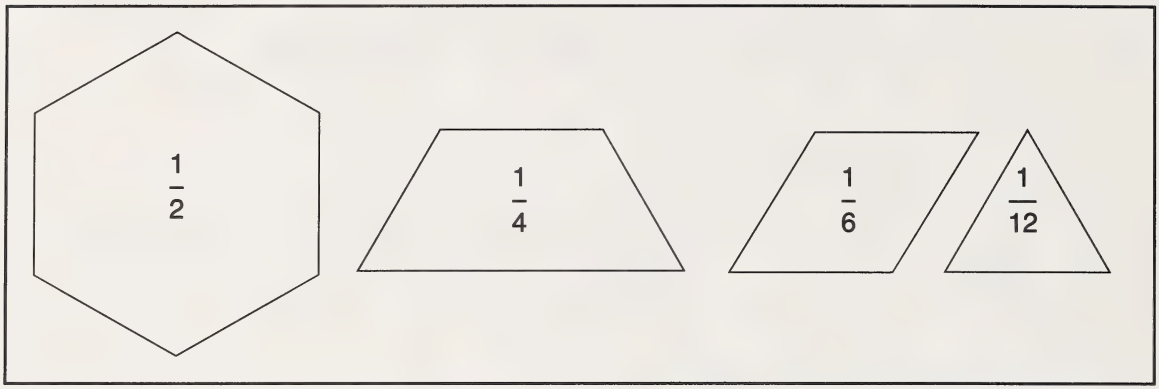
   b.

   are _____ of the whole.

   c. The sum of 3 triangles and 5 triangles is _____ triangles.

   d. The sum is _____ of the whole.

   e. The sum is _____ in simplest form.




3. Use pattern blocks to add the following. Write all sums in simplest form.

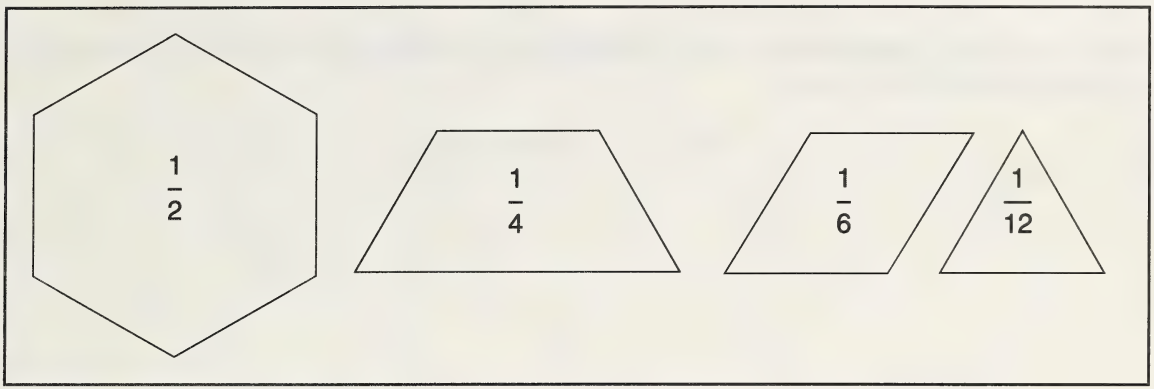
a. $\frac{1}{4} + \frac{1}{4} =$

b. $\frac{1}{6} + \frac{2}{6} =$

c. $\frac{2}{12} + \frac{1}{12} =$

d. $\frac{2}{6} + \frac{3}{6} =$

e. $\frac{2}{4} + \frac{1}{4} =$



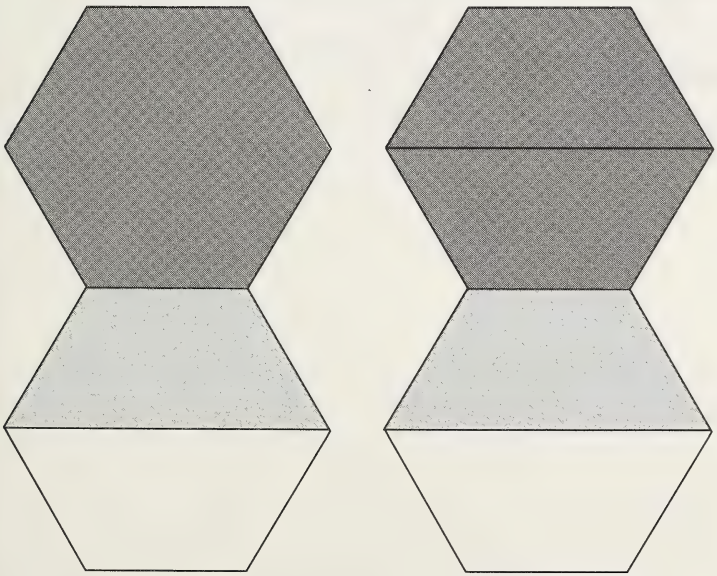

What is the sum of one hexagon and one trapezoid?

One hexagon is $\frac{1}{2}$ of the whole.

One trapezoid is $\frac{1}{4}$ of the whole.

One hexagon is equivalent to two trapezoids or $\frac{2}{4}$ of the whole.

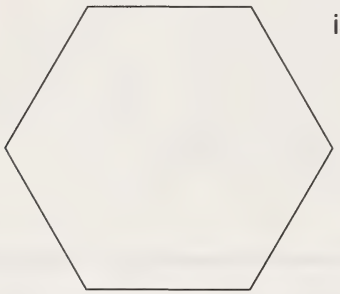
The sum of one hexagon and one trapezoid is the same as the sum of two trapezoids and one trapezoid or three trapezoids. This sum is $\frac{3}{4}$ of the whole.

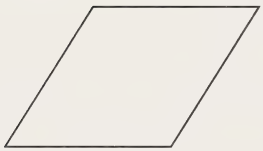


$$\text{So } \frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4}$$

$$= \frac{3}{4}$$

Find the following answers by trading the blocks for the fewest blocks of one shape and then by combining the blocks.

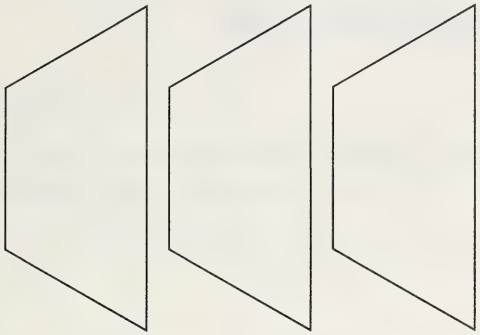
4. a.  is _____ of the whole.

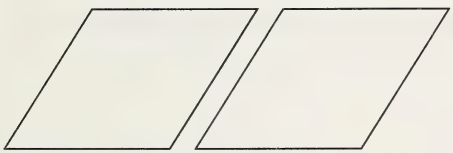
b.  is _____ of the whole.

c. One hexagon is equivalent to _____ parallelograms or _____ of the whole.

d. The sum of one hexagon and one parallelogram is _____ parallelograms or _____ of the whole.

e. This sum is _____ in simplest form.

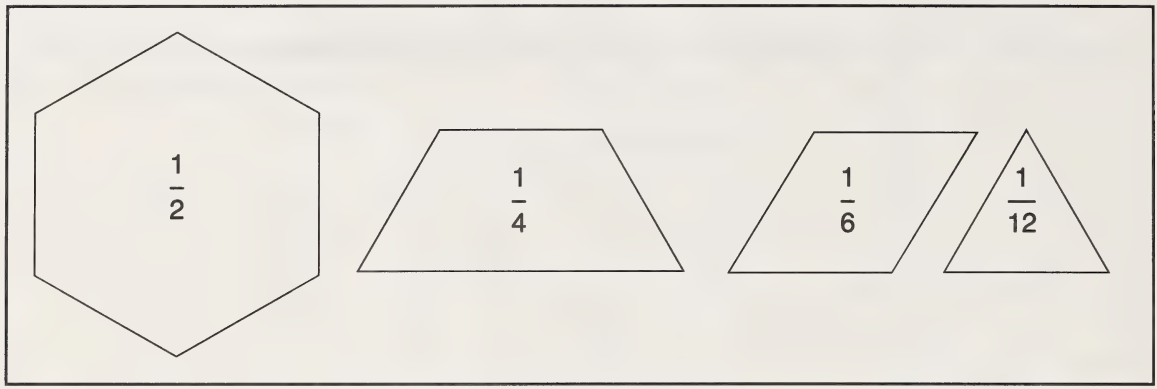
5. a.  is _____ of the whole.

b.  is _____ of the whole.

c. Three trapezoids is equivalent to _____ triangles, or _____ of the whole.

d. Two parallelograms is equivalent to _____ triangles or _____ of the whole.

e. The sum of three trapezoids and two parallelograms is _____ triangles or _____ of the whole.




6. Use pattern blocks to add the following. Write all the sums in simplest form.

a. $\frac{1}{6} + \frac{1}{2} =$

b. $\frac{5}{6} + \frac{1}{12} =$

c. $\frac{1}{4} + \frac{1}{2} =$

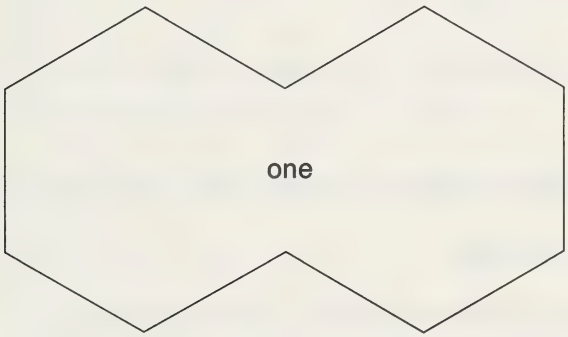
d. $\frac{3}{4} + \frac{1}{6} =$

Return to your Module Booklet.

# SUBTRACTING FRACTIONS

## Exercise F

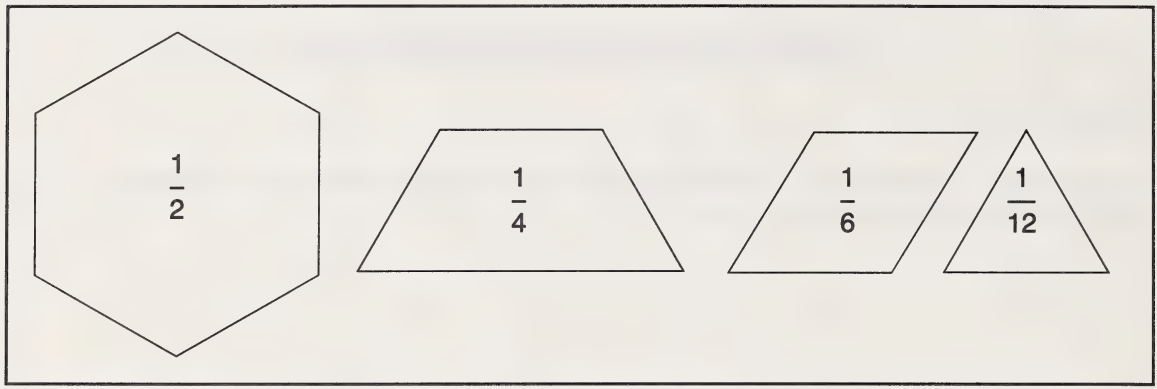
As you have discovered many different shapes can represent one whole. However, for this exercise this shape represents one:




Subtraction involves removing parts.

It is easier to subtract fractions with common denominators. With pattern blocks you are taking away blocks of the same shapes.

It is more difficult to subtract fractions that do not have common denominators. With pattern blocks you are taking away blocks of different shapes.




**Example**

Three trapezoids is $\frac{3}{4}$ of the whole.

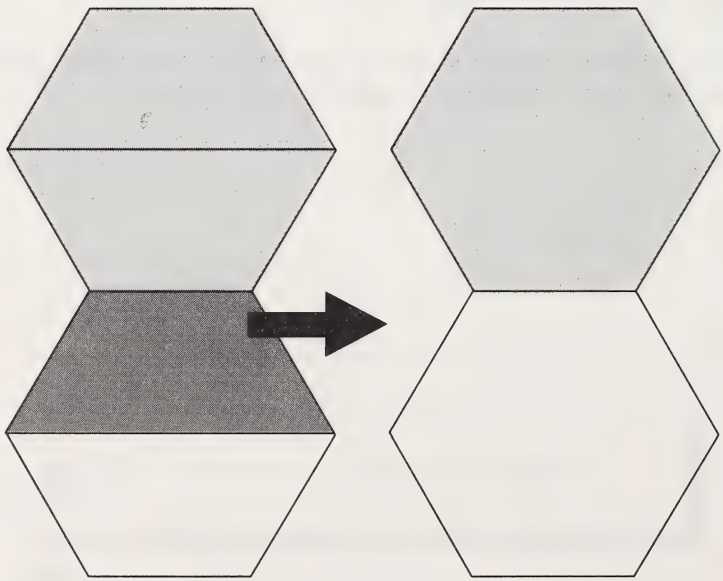
One trapezoid is $\frac{1}{4}$ of the whole.

Three trapezoids take away one trapezoid is two trapezoids.

The difference is $\frac{2}{4}$ of the whole.

Two trapezoids is equivalent to one hexagon.

This is $\frac{1}{2}$ of the whole.



So $\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$

$= \frac{1}{2}$

1. a.

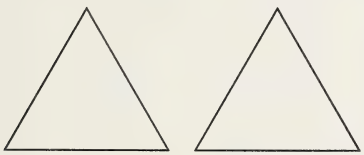
are _____ of the whole.

b. are _____ of the whole.

c. Four parallelograms take away three parallelograms is _____ parallelograms or _____ of the whole.

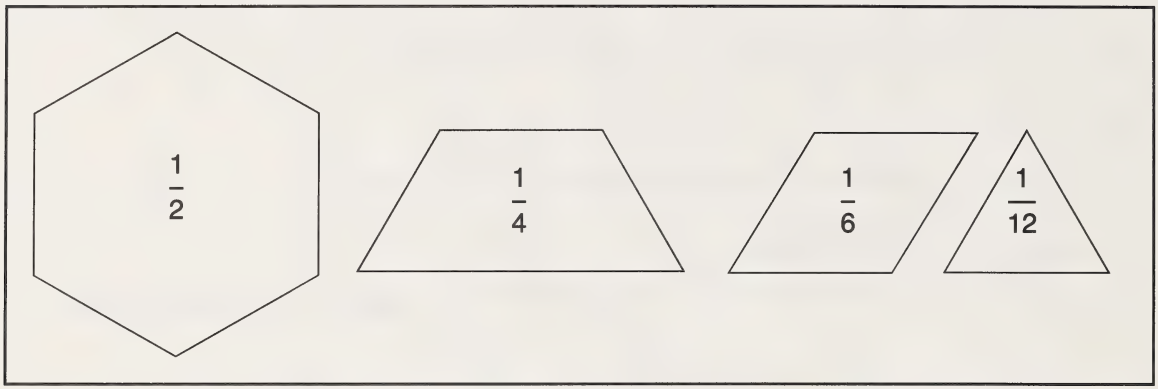
2. a.

are _____ of the whole.

b.  are _____ of the whole.

c. Five triangles take away two triangles is _____ triangles or _____ of the whole.

d. This difference is _____ of the whole in simplest form.




3. Use pattern blocks to solve these problems. Write all differences in simplest form.

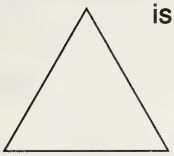
a. $\frac{11}{12} - \frac{4}{12} =$

b. $\frac{3}{4} - \frac{2}{4} =$

c. $\frac{5}{6} - \frac{4}{6} =$

d. $\frac{2}{2} - \frac{1}{2} =$

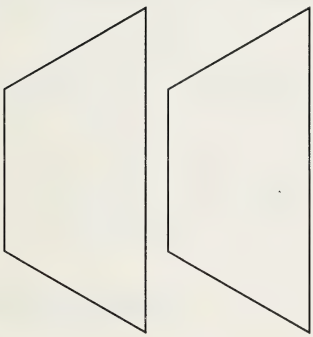
4. a. are _____ of the whole.

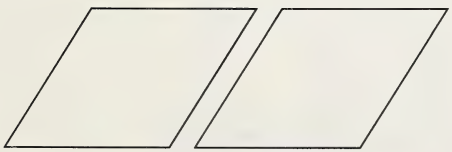
b.  is _____ of the whole.

c. Two parallelograms are equivalent to _____ triangles, or _____ of the whole.

d. Two parallelograms take away one triangle is _____ triangles, or _____ of the whole.

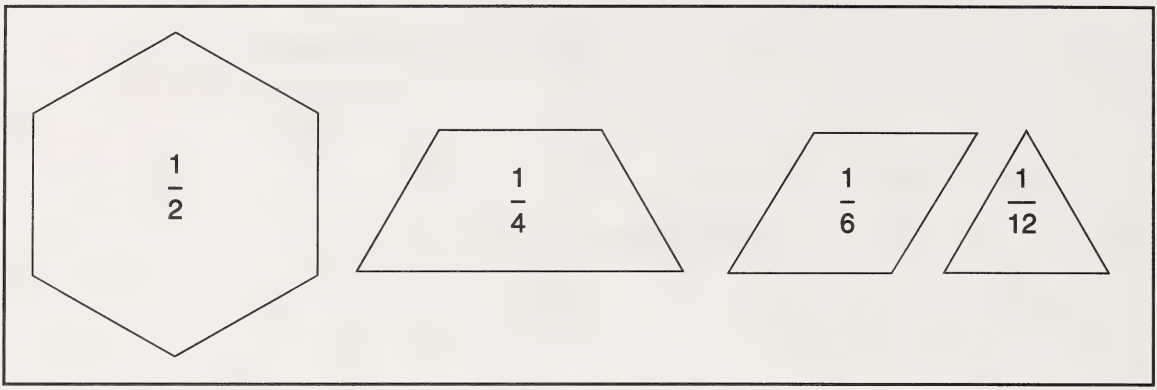
e. This difference is _____ of the whole in simplest form.

5. a.  are _____ of the whole.

b.  are _____ of the whole.

c. Two trapezoids are equivalent to _____ parallelograms or _____ of the whole.

d. Two trapezoids take away two parallelograms are _____ parallelograms or _____ of the whole.




7. Use pattern blocks to solve these problems. Write all differences in simplest form.

a. $\frac{1}{2} - \frac{1}{6} =$

b. $\frac{2}{12} - \frac{5}{6} =$

c. $\frac{1}{6} - \frac{1}{12} =$

d. $\frac{11}{12} - \frac{3}{4} =$

Return to your Module Booklet.

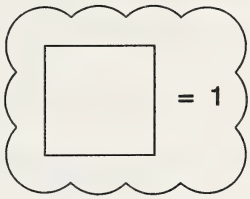
# MULTIPLYING FRACTIONS

## Exercise G

As you learned previously when working whith whole numbers, multiplying involves grouping.

**Example**

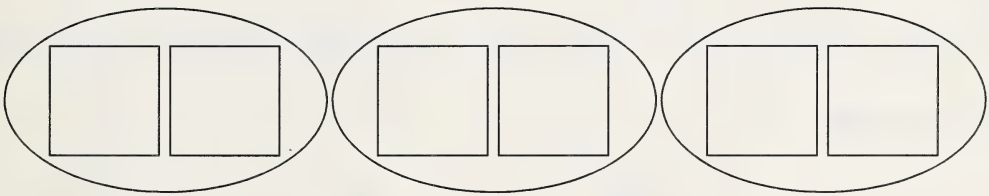
What is 3 × 2?




Think about the meaning of multiplication.

3 × 2 can mean "3 groups of 2".

Arrange the pieces into 3 groups of 2.



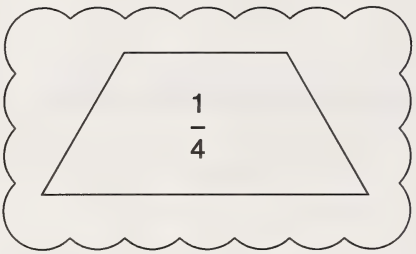
Combine the pieces.

So 3 × 2 = 6.

You can also model the multiplication of fractions using pattern blocks.

**Example**

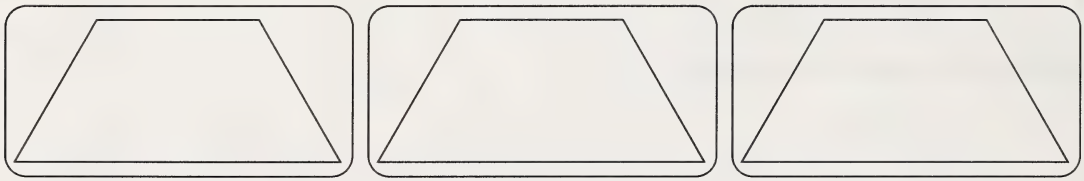
What is $3 \times \frac{1}{4}$?



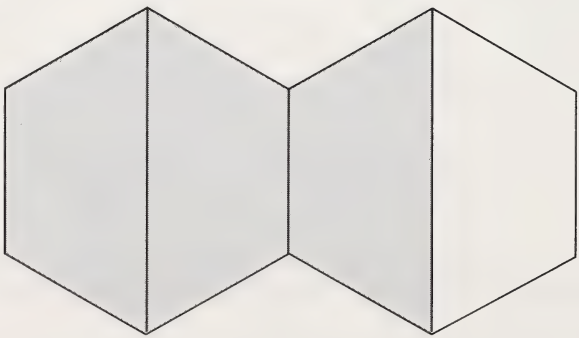

Think about the meaning of multiplication.

$3 \times \frac{1}{4}$ can mean " 3 groups of $\frac{1}{4}$ ".

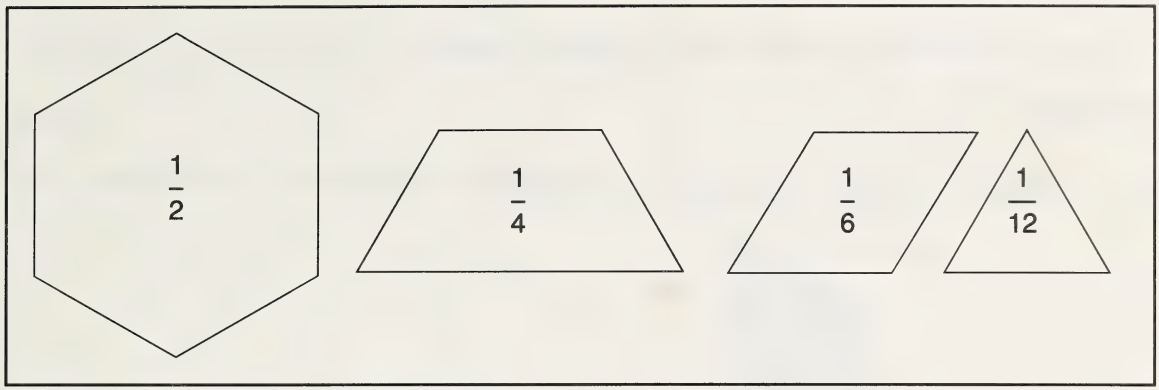
Arrange the blocks in 3 groups of $\frac{1}{4}$.



Combine the pieces.



So $3 \times \frac{1}{4} = \frac{3}{4}$.




1. Use pattern blocks to solve these problems. Write all products in simplest form.

a. $2 \times \frac{1}{12} =$

b. $3 \times \frac{5}{6} =$

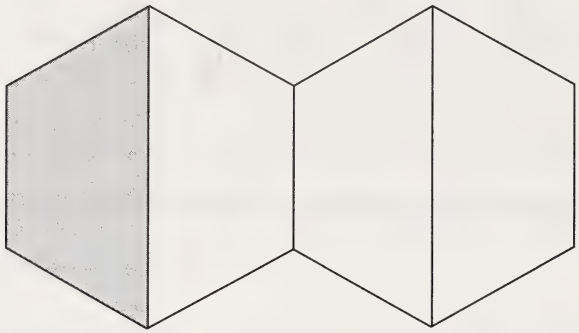
c. $4 \times \frac{3}{4} =$

d. $2 \times \frac{5}{12} =$

You will now learn what multiplying by a fraction means.

**Example**

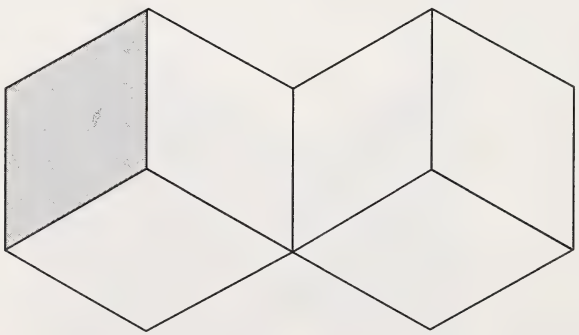
$\frac{1}{4} \times 1$ means one of four equal parts of one whole.



One trapezoid is $\frac{1}{4}$ of the whole.

So $\frac{1}{4} \times 1 = \frac{1}{4}$.

2. a. $\frac{1}{6} \times 1$ means one of _____ equal parts of one whole.



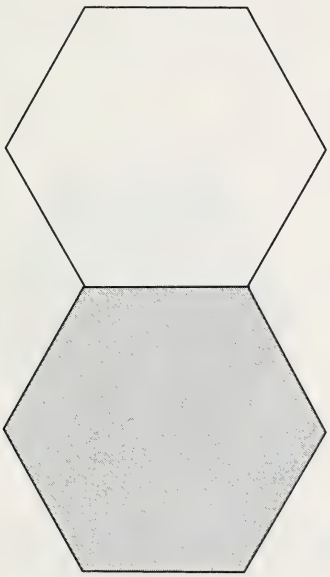
b. One parallelogram is _____ of one whole.

c. $\frac{1}{6} \times 1 =$

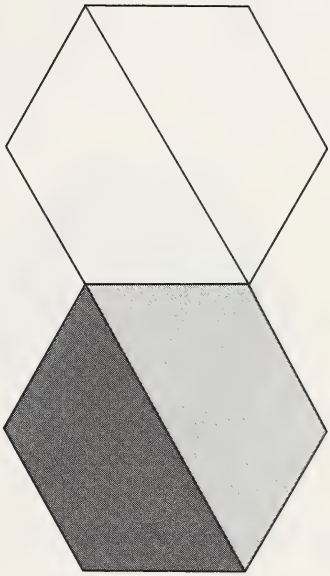
You can multiply two fractions.

**Example**

$\frac{1}{2} \times \frac{1}{2}$ means one of two equal parts of one-half.



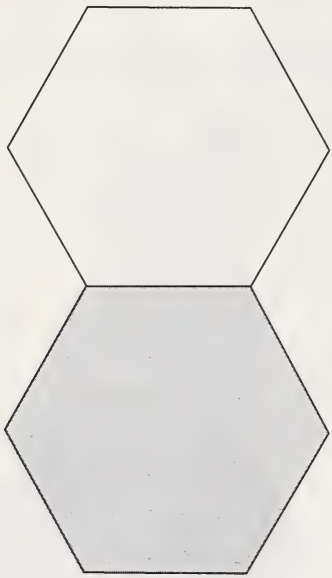
One hexagon is $\frac{1}{2}$ of one whole.



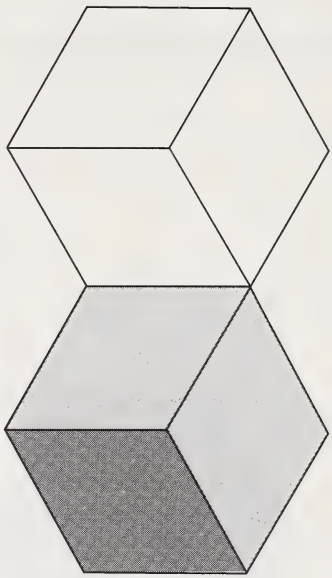
One trapezoid is $\frac{1}{2}$ of one hexagon, and $\frac{1}{4}$ of one whole.

So $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.

3. $\frac{1}{3} \times \frac{1}{2}$ means one of three equal parts of one-half.



One hexagon is $\frac{1}{2}$ of one whole.



a. One parallelogram is $\frac{1}{3}$ of one hexagon, and _____ of one whole.

b. So $\frac{1}{3} \times \frac{1}{2} =$

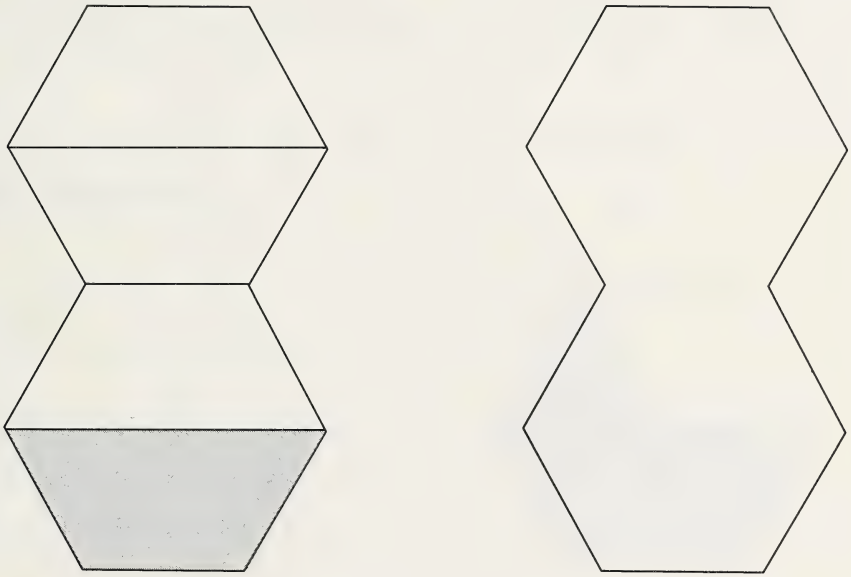
4. a. $\frac{1}{6} \times \frac{1}{2}$ means _____

b. What is $\frac{1}{6} \times \frac{1}{2}$? Show it with pattern blocks.

c. So $\frac{1}{6} \times \frac{1}{2} =$

5 a. $\frac{2}{3} \times \frac{1}{4}$ means _____

b. What is $\frac{2}{3} \times \frac{1}{4}$? Show it with pattern blocks.

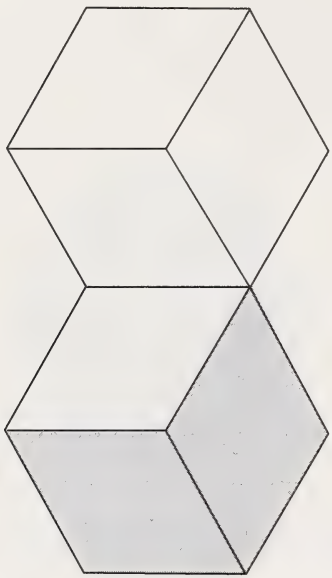


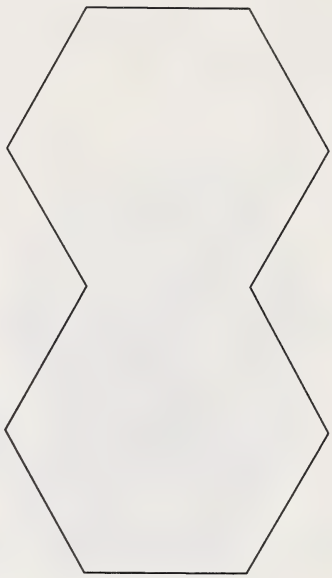
One trapezoid is $\frac{1}{4}$ of one whole.

c. So $\frac{2}{3} \times \frac{1}{4} =$

6. a. $\frac{3}{4} \times \frac{2}{6}$ means _____ .

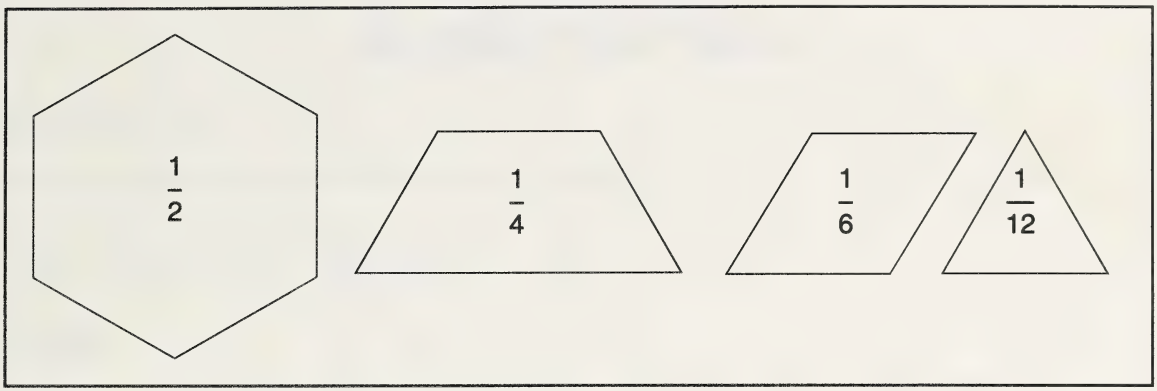
b. What is $\frac{3}{4} \times \frac{2}{6}$ ? Show it with pattern blocks.





Two parallelograms are $\frac{2}{6}$ of the whole.

c. So $\frac{3}{4} \times \frac{2}{6} =$




7. Solve using pattern blocks.

a. $\frac{1}{3} \times \frac{1}{4} =$

b. $\frac{1}{2} \times \frac{1}{2} =$

c. $\frac{1}{4} \times \frac{2}{6} =$

d. $\frac{2}{3} \times \frac{1}{2} =$

e. $\frac{5}{6} \times \frac{1}{2} =$

f. $\frac{2}{3} \times \frac{3}{4} =$

Return to your Module Booklet.

# DIVIDING FRACTIONS

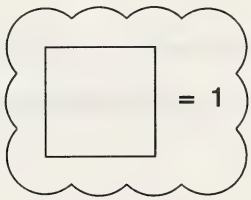
## Exercise H

When you divide you ask yourself these questions:

- How many groups are there?
- How many are there in each group?

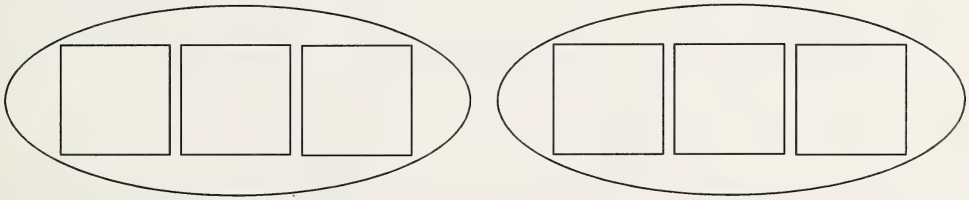
**Example**

What is 6 ÷ 2 ?




6 ÷ 2 can mean in 6 there are 2 groups of how many?

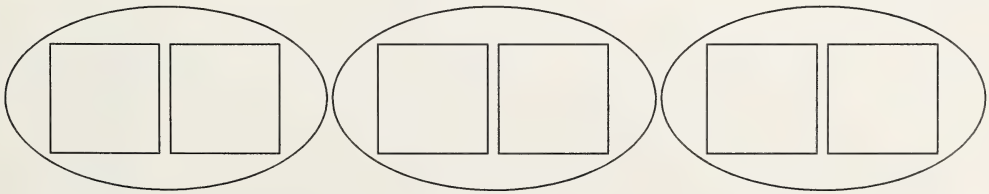
Arrange the 6 whole into 2 groups.



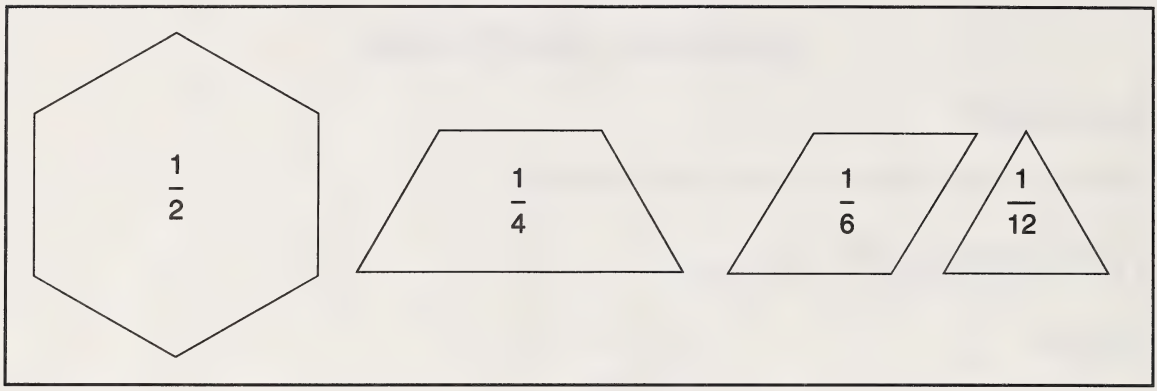
There are 3 wholes in each group. So 6 ÷ 2 = 3.

6 ÷ 2 can also mean in 6 there are how many groups of 2.

Arrange the 6 wholes into groups of 2.



There are 3 groups. So 6 ÷ 2 = 3.

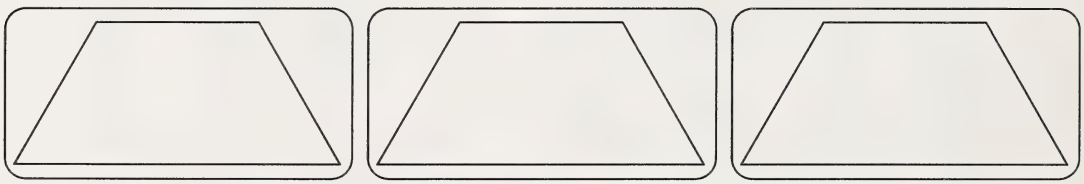



You can divide with fractions. Let's use pattern blocks to show this.

**Example**

$\frac{3}{4} \div 3$ means in $\frac{3}{4}$ there are 3 groups of how many?

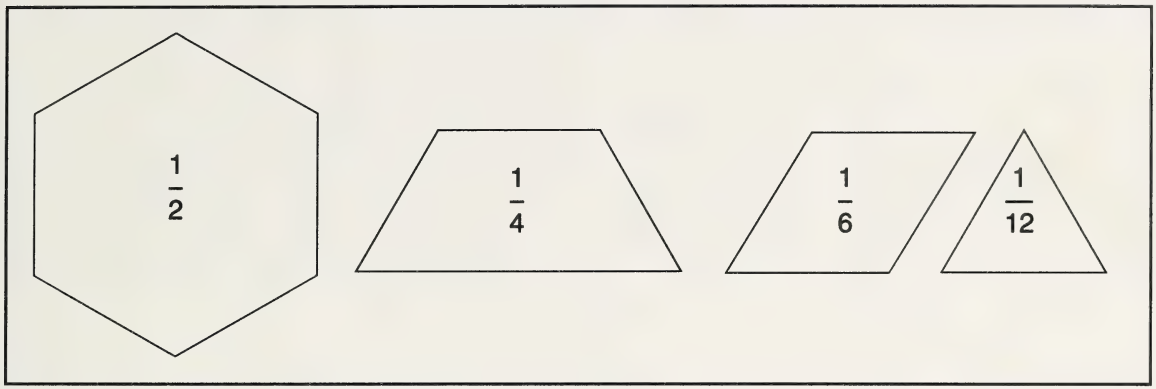
You can put the 3 trapezoids into 3 groups.



Each group has one trapezoid.

One trapezoid is $\frac{1}{4}$ of the whole.

So $\frac{3}{4} \div 3 = \frac{1}{4}$.

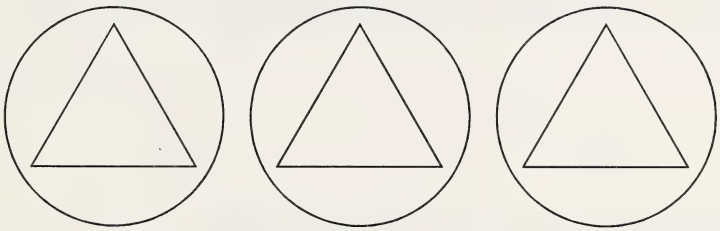



You can trade pattern blocks in order to divide.

**Example**

$\frac{1}{4} \div 3$ means in $\frac{1}{4}$ there are 3 groups of how many?

You cannot put one trapezoid into 3 groups so trade one trapezoid for 3 triangles. Then arrange the triangles into 3 groups.

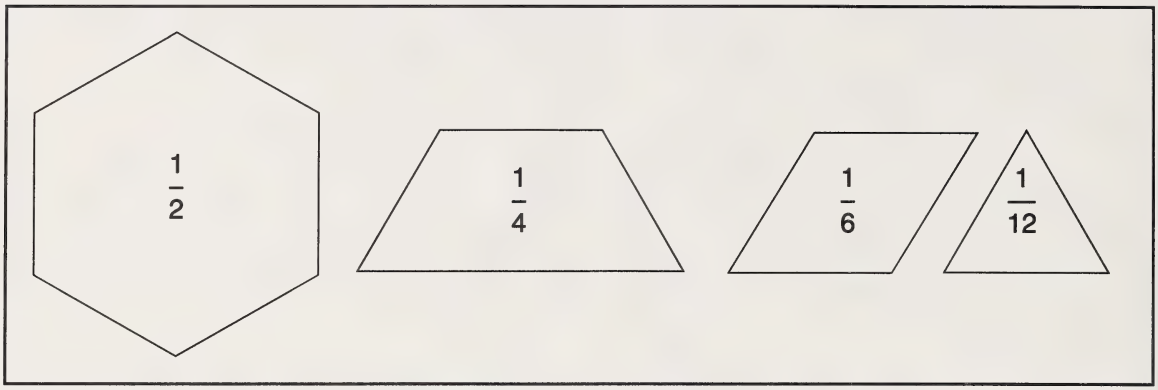


Each group has one triangle.

One triangle is $\frac{1}{12}$ of the whole.

$$\text{So } \frac{1}{4} \div 3 = \frac{3}{12} \div 3$$

$$= \frac{1}{12}$$




1. Use pattern blocks to solve the following problems.

   a. $\frac{1}{4} \div 3$ means in $\frac{1}{4}$ there are 3 groups of how many?

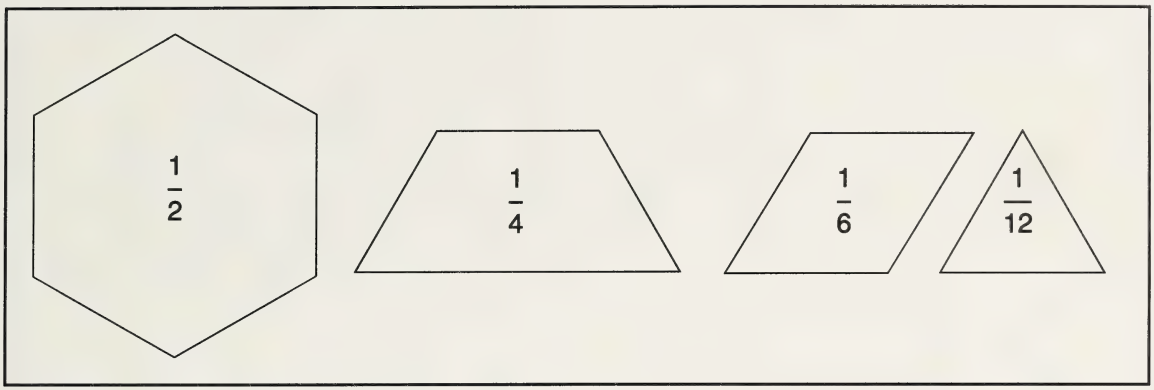
   $\frac{1}{4} \div 3 =$

   b. $\frac{1}{2} \div 3$ means in $\frac{1}{2}$ there are 3 groups of how many?

   $\frac{1}{2} \div 3 =$

   c. $\frac{5}{6} \div 2$ means in $\frac{5}{6}$ there are 2 groups of how many?

   $\frac{5}{6} \div 2 =$



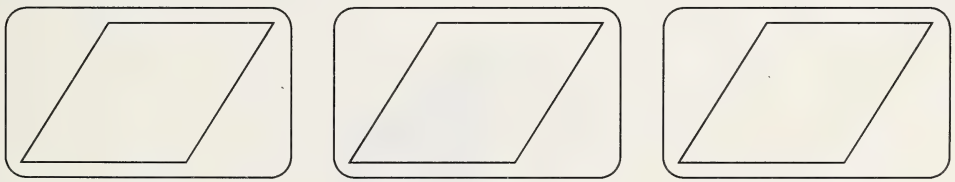

You can divide by a fraction.

**Example**

$\frac{1}{2} \div \frac{1}{6}$ means in $\frac{1}{2}$ there are how many groups of $\frac{1}{6}$.

Trade one hexagon for three parallelograms.

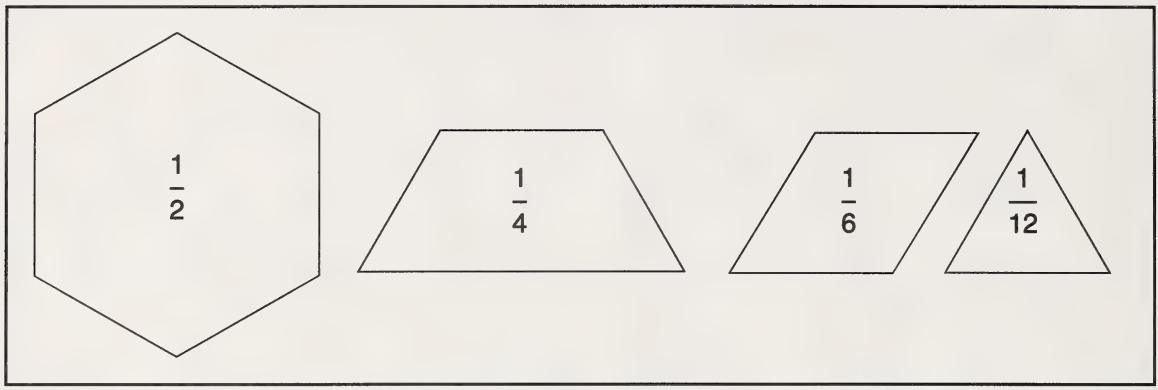
$\frac{3}{6} \div \frac{1}{6}$ means in 3 sixths there are how many groups of 1 sixth?



There are 3 groups of one-sixth.

So $\frac{1}{2} \div \frac{1}{6} = \frac{3}{6} \div \frac{1}{6}$

$= 3$

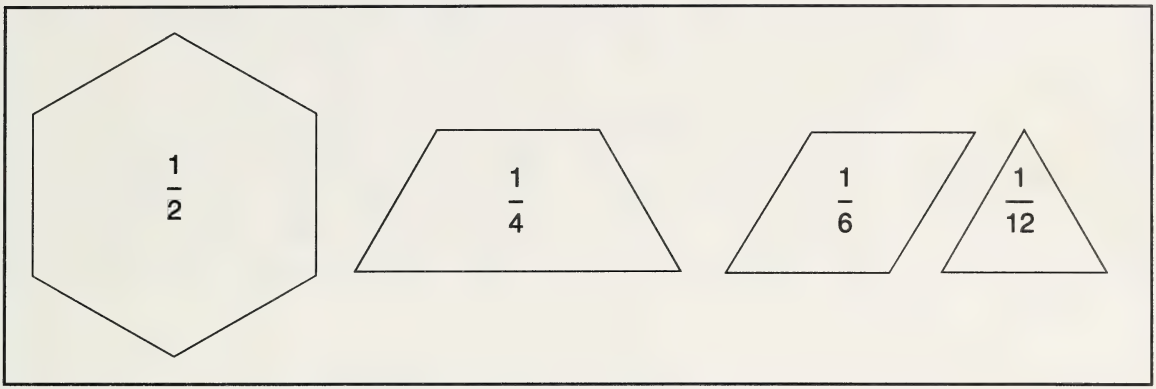



2. Use pattern blocks to find the answer for each problem.

a. $\frac{3}{4} \div \frac{1}{4} =$

b. $\frac{4}{6} \div \frac{2}{6} =$

c. $\frac{1}{2} \div \frac{1}{4} =$



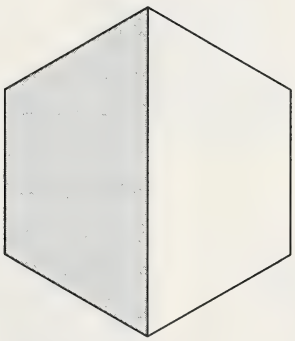

Some division problems have a fraction or less than one group as a quotient.

**Example**

$\frac{1}{4} \div \frac{1}{2}$ means in $\frac{1}{4}$ there are how many groups of $\frac{1}{2}$?

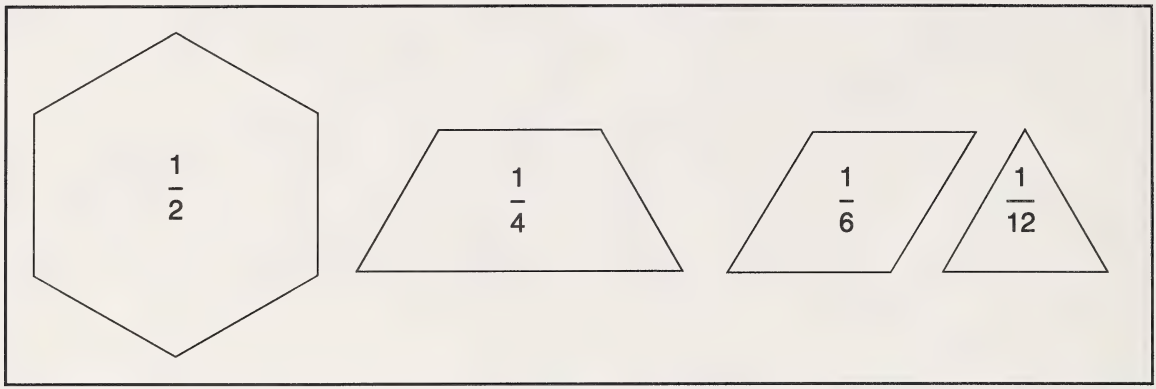
Trade one hexagon for 2 trapezoids.

$\frac{1}{4} \div \frac{2}{4}$ means in $\frac{1}{4}$ there are how many groups of $\frac{2}{4}$?



There is half of one group.

So $\frac{1}{4} \div \frac{1}{2} = \frac{1}{2}$.

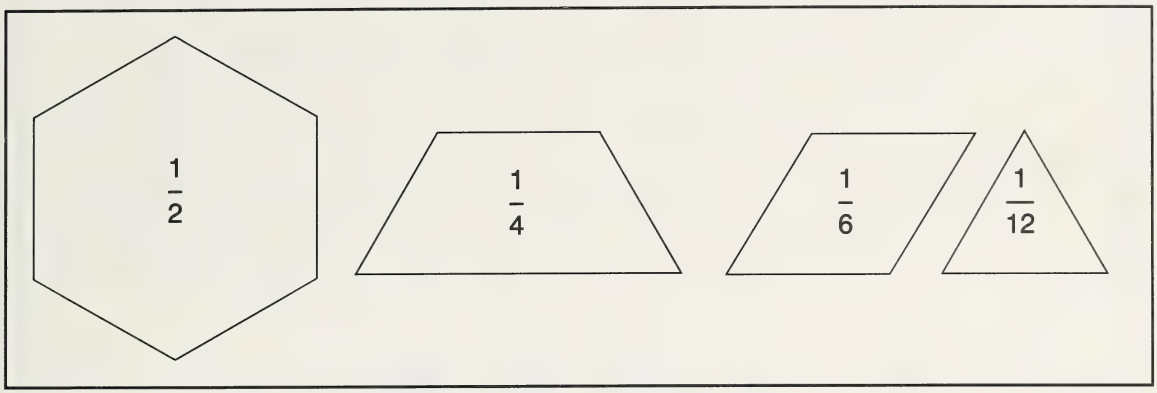



3. Solve these problems with pattern blocks.

a. $\frac{1}{2} \div \frac{3}{4} =$

b. $\frac{1}{6} \div \frac{1}{4} =$

c. $\frac{1}{2} \div \frac{5}{6} =$




Some division problems have a mixed number in the quotient.

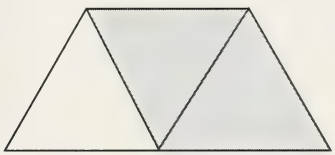
**Example 1**

$\frac{1}{4} \div \frac{1}{6}$ means in $\frac{1}{4}$ there are how many groups of $\frac{1}{6}$.

Trade one trapezoid for three triangles.

Trade one parallelogram for two triangles.

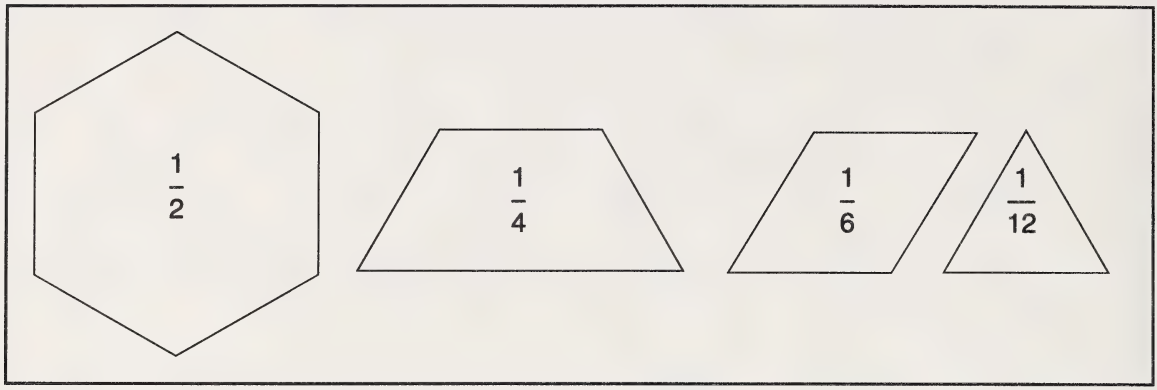
$\frac{3}{12} \div \frac{2}{12}$ means in 3 twelfths there are how many groups of 2 twelfths.



There is one group and half of a second group.

So $\frac{1}{4} \div \frac{1}{6} = \frac{3}{12} \div \frac{2}{12}$

$= 1\frac{1}{2}$




4. Solve these division problems with pattern blocks.

a. $\frac{3}{4} \div \frac{1}{2} =$

b. $\frac{5}{6} \div \frac{1}{4} =$

c. $\frac{3}{4} \div \frac{5}{12} =$

Return to your Module Booklet.

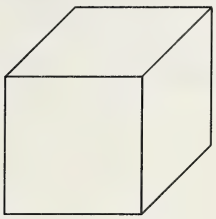
# Part Two

# Decimals

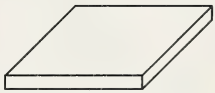
# INTERPRETING A DECIMAL NUMBER

## Exercise I

All of the activities in this part of the booklet use base ten blocks to represent decimal numbers. There are four basic pieces in the set.



block

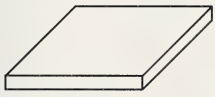
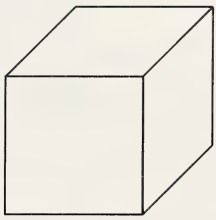


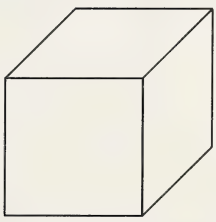
flat

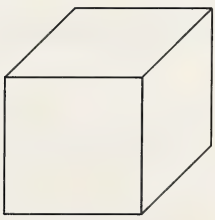
long

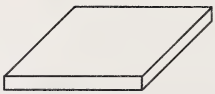
unit

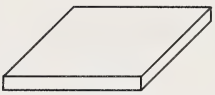
1. Explore the relationship between the pieces?

a. How many  flats equal 1  ?

b. How many longs equal 1  ?

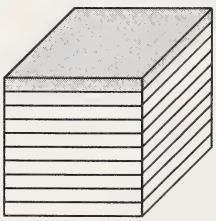
c. How many units equal 1  ?

d. How many longs equal 1  flat ?

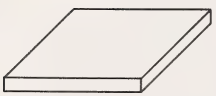
e. How many units equal 1  flat ?

f. How many units equal 1 long ?

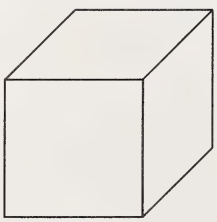
A decimal number represents a part of a whole.



One of 10 equal parts of the block is shaded.

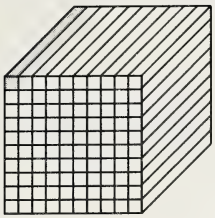


1 flat =

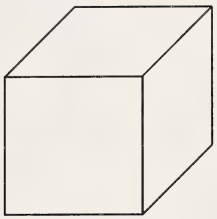


0.1 of 1 block

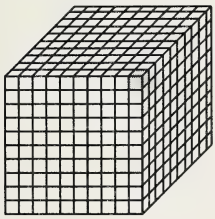
0.1 is read as 1 tenth



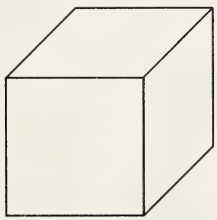
1 of 100 equal parts of the block is shaded.

1 long =  0.01 of 1 block

0.01 is read as 1 hundredth

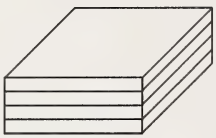
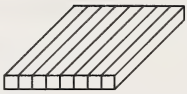
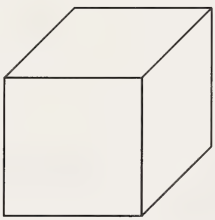
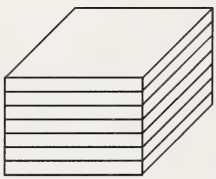
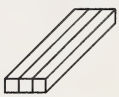
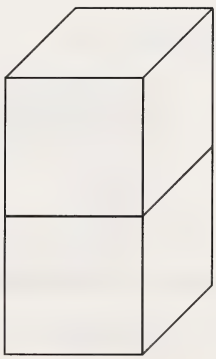
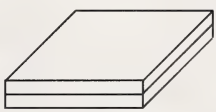


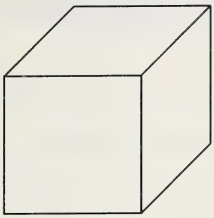
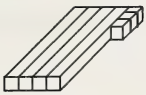
1 of 1000 equal parts of the block is shaded.

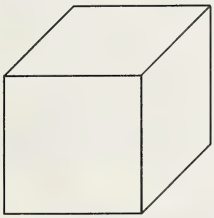
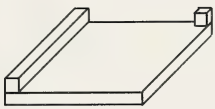
1 unit =  0.001 of 1 block.

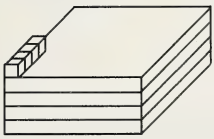
0.001 is read as 1 thousandth

2. What number does each of these models represent? The first one has been done as an example.

| | ones | tenths | hundredths | thousandths | |
|---|---|---|---|---|---|
| a. | |  |  | | 0.482 |
| b. |  |  |  | | _____ |
| c. |  |  | | | _____ |

d.   _____

e.   _____

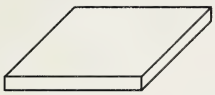
f.  _____

Return to your Module Booklet.

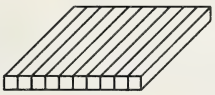
# COMPARING AND ORDERING DECIMAL NUMBERS

## Exercise J

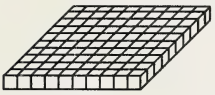
A decimal number may have many different names. Below are shown some different names
for 0.1.



= 0.1



= 0.10



= 0.100

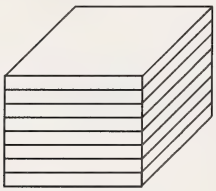
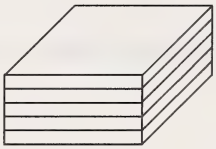
1. Build other models equivalent to the following and record their names here.

   a. 0.5 _____ _____

   b. 0.03 _____

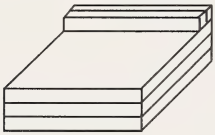
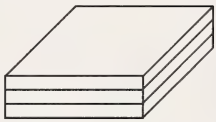
   c. 0.13 _____

2. a. Which is larger 0.8 or 0.5?


or


_____

b. Which is larger 0.32 or 0.3?


or


_____

3. Make models of the following and compare the numbers.

Which is larger?

a. 0.32 or 0.4? _____

b. 0.1 or 0.02? _____

c. 0.125 or 0.3? _____

Return to your Module Booklet.

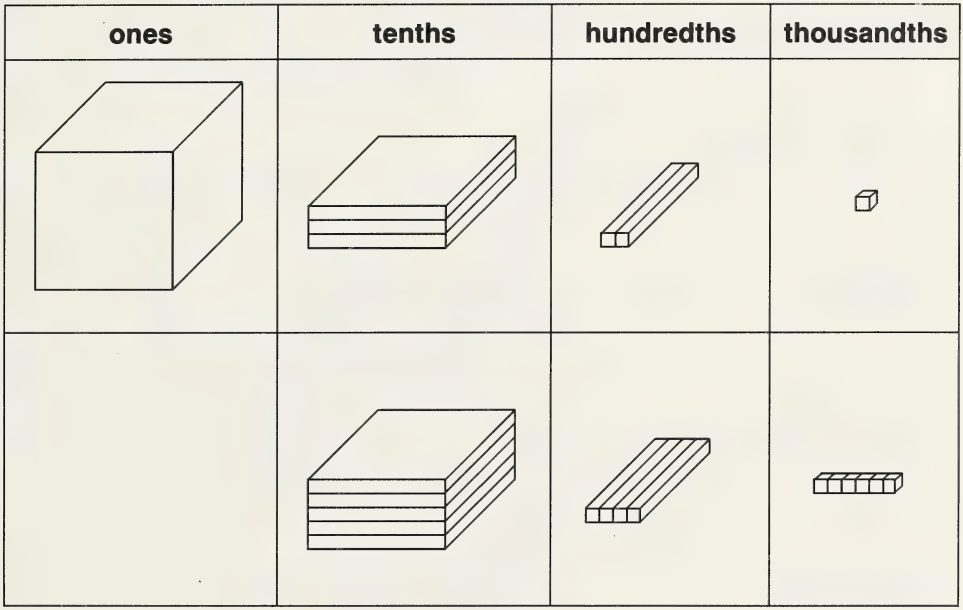
# ADDING DECIMAL NUMBERS

## Exercise K

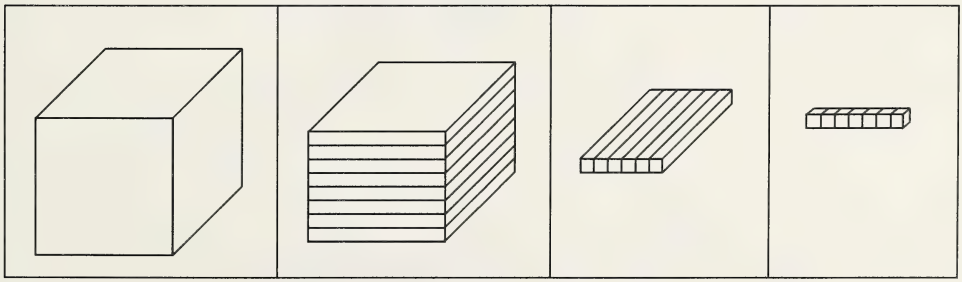
Your base 10 blocks will allow you to add in a concrete way.

Example 1.321 + 0.546

Step 1:
Form the numbers.




Step 2:
Combine the pieces from right to left.



Step 3:
Write the number sentence. 1.321 + 0.546 = 1.867

1. Use base 10 blocks to build models of these sums. Record your answers in the space provided.

   a. 1.1 + 0.8 = _____

   b. 1.5 + 1.32 = _____

   c. 0.234 + 0.153 = _____

   d. 0.012 + 0.101 = _____

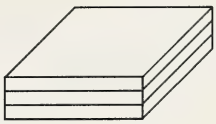
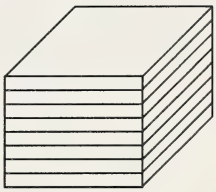
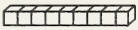
   e. 0.1 + 1.23 = _____

   f. 1.25 + 1.302 = _____

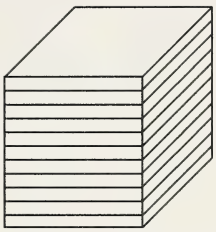
Sometimes regrouping is needed.

**Example** 0.302 + 0.809

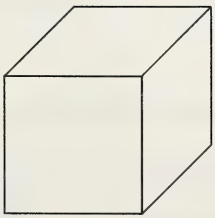
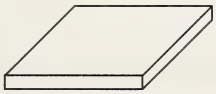
Step 1:
Form the numbers.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| |  | | |
| |  | |  |

Step 2:
Combine the pieces from right to left.

| | | | |
|---|---|---|---|
| |  | | |

Step 3:
Trade 10 units for 1 long.
Trade 10 flats for 1 block.

| | | | |
|---|---|---|---|
|  |  | | |

Step 4:
Write the number sentence. 0.302 + 0.809 = 1.111

2. Use base 10 blocks to build models of these sums. Record your answers in the space provided.

   a. 1.05 + 1.08 = _____

   b. 0.132 + 0.09 = _____

   c. 1.237 + 0.354 = _____

Return to your Module Booklet.

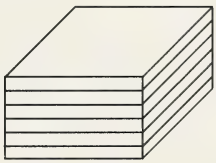
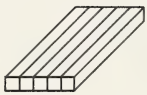
# SUBTRACTING DECIMAL NUMBERS

## Exercise L

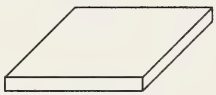
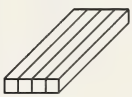
Base 10 blocks may be used to model subtraction.

**Example** 0.65 – 0.51

Step 1:
Form the first number.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| |  |  | |

Step 2:
Take away the required pieces.

| | | | |
|---|---|---|---|
| |  |  | |

Step 3:
Write the number sentence. 0.65 – 0.51 = 0.14

1. Use base 10 blocks to build models of these differences. Record your answers in the space provided.

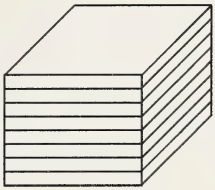
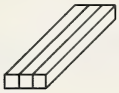
   a. 1.8 – 1.6 = _____

   b. 0.234 – 0.132 = _____

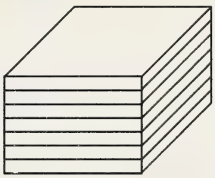
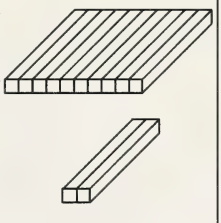
Sometimes regrouping is needed.

**Example** 0.832 – 0.553

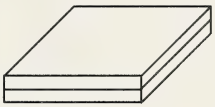
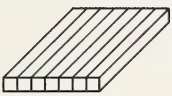
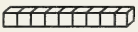
Step 1:
Form the first number.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| |  |  | |

Step 2:
Trade 1 flat for 10 longs.
Trade 1 long for 10 units.

| | | | |
|---|---|---|---|
| |  |  | |

Step 3:
Take away the required pieces.

| | | | |
|---|---|---|---|
| |  |  |  |

Step 4:
Write a number sentence 0.832 – 0.553 = 0.279

2. Use base 10 blocks to build models of these differences. Record your answers in the space provided.

   a. 1.5 – 0.32 = _____

   b. 0.25 – 0.18 = _____

   c. 0.981 – 0.876 = _____

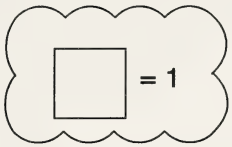
Return to your Module Booklet.

# MULTIPLYING DECIMAL NUMBERS

## Exercise M

As you learned previously when working with whole numbers, multiplying involves grouping.

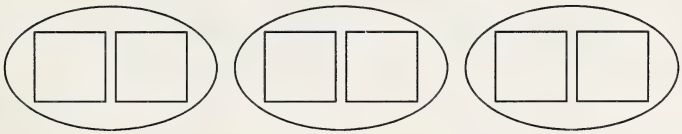
**Example** What is 3 × 2?




Step 1: Think about the meaning of multiplication.

3 × 2 can mean " 3 groups of 2"

Step 2: Arrange the pieces into 3 groups of 2.



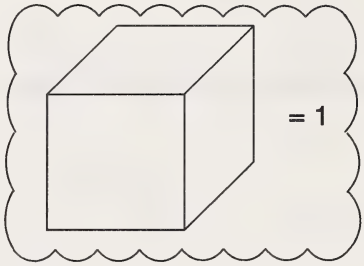
Step 3: Combine the pieces.

Step 4: Write the number sentence.

3 × 2 = 6

You can also model multiplication of decimal numbers using base ten blocks.

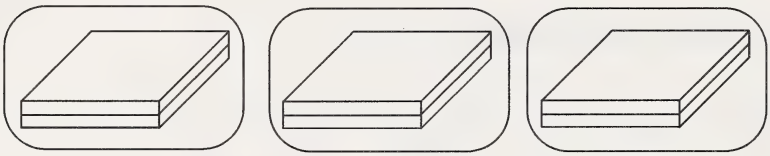
**Example** What is 3 × 0.2?



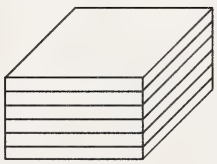

Step 1: Think about the meaning of multiplication.

3 × 0.2 can mean 3 groups of 0.2

Step 2: Arrange the pieces in 3 groups of 0.2.



Step 3: Combine the pieces.



Step 4: Write a number sentence.

3 × 0.2 = 0.6

1. Make models to show the following products. Record the answers in the space provided.

   a. $1 \times 0.3 =$ _____

   b. $3 \times 0.2 =$ _____

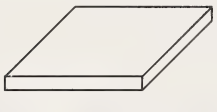
   c. $5 \times 0.4 =$ _____

   d. $2 \times 1.2 =$ _____

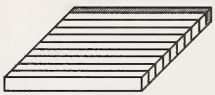
The previous example showed a whole number times a decimal number. You can also model two decimal numbers being multiplied. Remember multiplication means "of." In the following examples you do not have a number of groups. Instead you have part of a group.

**Example 1** 0.1 × 0.1

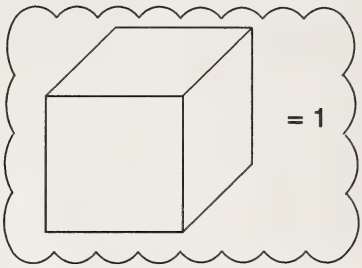
0.1 × 0.1 means 0.1 of 0.1 ← Read 1 tenth of 1 tenth.

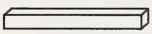


all of 0.1



0.1 of 0.1

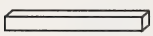



or  (0.01)

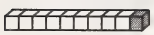
So 0.1 × 0.1 = 0.01

**Example 2** 0.1 × 0.01

0.1 × 0.01 means 0.1 of 0.01 ← Read 1 tenth of 1 hundredth.



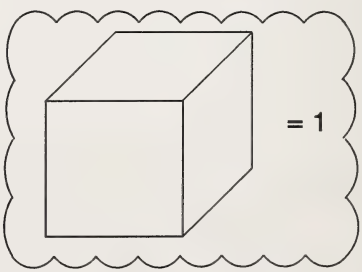
all of 0.01



0.1 of 0.01

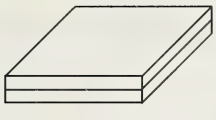
or (0.001)

So 0.1 × 0.01 = 0.001

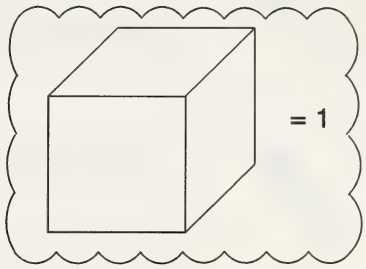


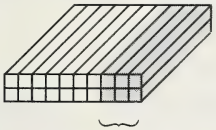
**Example 3** $0.3 \times 0.2$

$0.3 \times 0.2$ means 0.3 of 0.2 ← Read 3 tenths of 2 tenths.

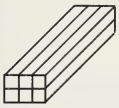


all of 0.2



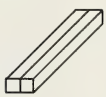
0.3 of 0.2

or  (0.06)

So $0.3 \times 0.2 = 0.06$

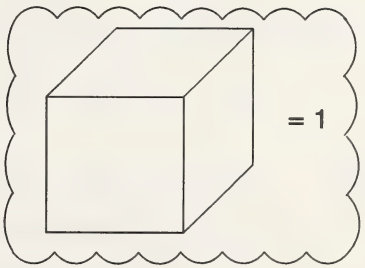
**Example 4** $0.3 \times 0.02$

$0.3 \times 0.02$ means 0.3 of 0.02 ← Read 3 tenths of 2 hundredths.



all of 0.02

0.3 of 0.02




or (0.06)

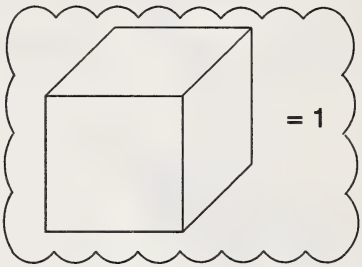
So $0.3 \times 0.02 = 0.006$

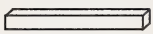
**Example 5** $0.5 \times 0.02$

$0.5 \times 0.02$ means 0.5 of 0.02 ← Read 5 tenths of 2 hundredths.

all of 0.02

0.5 of 0.02




or or or  (0.01)

So $0.5 \times 0.02 = 0.01$

2. Make models to show the following products. Record the answers in the space provided.

   a. $0.3 \times 0.1 =$ _____

   b. $0.3 \times 0.6 =$ _____

   c. $0.3 \times 0.01 =$ _____

   d. $0.3 \times 0.04 =$ _____

Return to your Module Booklet.

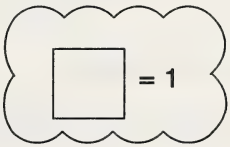
# DIVIDING BY A WHOLE NUMBER

## Exercise N

When you divide you ask yourself these questions.

- How many groups are there?
- How many pieces are there in each group?

**Example** What is 6 ÷ 2?

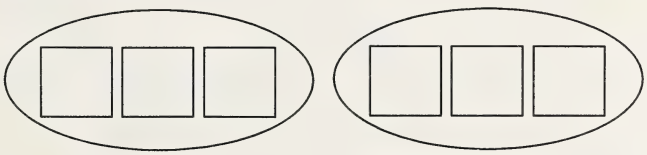



Step 1: Think about the meaning of division.

6 ÷ 2 can mean in 6 there are 2 groups of how many?

Step 2: Form the number 6.

Step 3: Arrange the pieces into 2 groups.

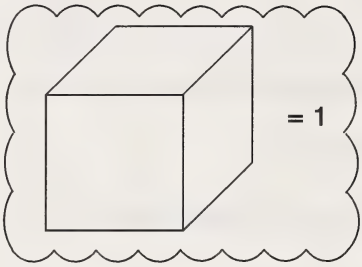


Step 4: Write a number sentence.

6 ÷ 2 = 3

You can also model dividing a decimal by a whole number using base ten blocks.

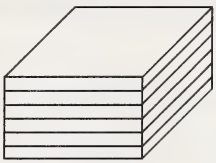
**Example 1** 0.6 ÷ 2



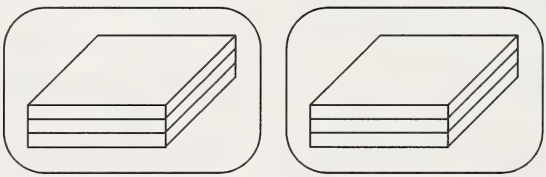

Step 1: Think about the meaning of division.

0.6 ÷ 2 can mean in 0.6 there are 2 groups of how many?''

Step 2: Form the number 0.6.



Step 3: Arrange the pieces into 2 groups.



Step 4: Write a number sentence.

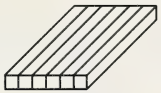
0.6 ÷ 2 = 0.3

**Example 2** 0.06 ÷ 3

Step 1: Think about the meaning of division.

0.06 ÷ 3 can mean in 0.06 there are 3 groups of how many?

Step 2: Form the number.



Step 3: Divide the pieces into 3 groups.

Step 4: Write a number sentence.

0.06 ÷ 3 = 0.02

1. Make models to show the following quotients. Record your answers.

   a. 0.4 ÷ 4 = _____

   b. 0.82 ÷ 2 = _____

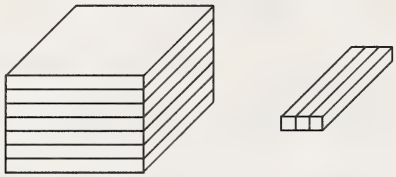
Sometimes regrouping is necessary.

**Example** $0.73 \div 2$

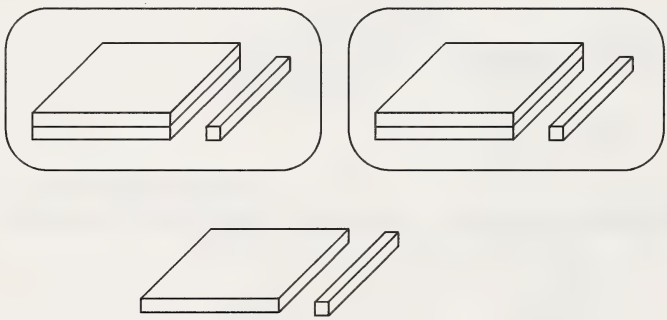
Step 1: Think about the meaning of division.

$0.73 \div 2$ can mean in 0.73 there are 2 groups of how many?

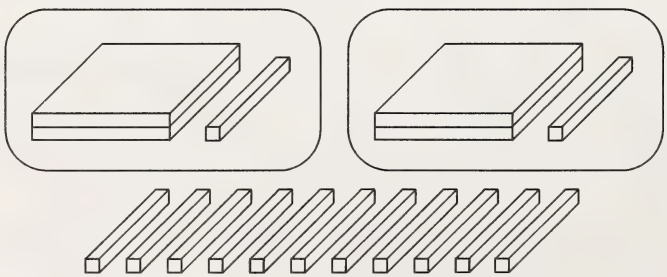
Step 2: Form the number.



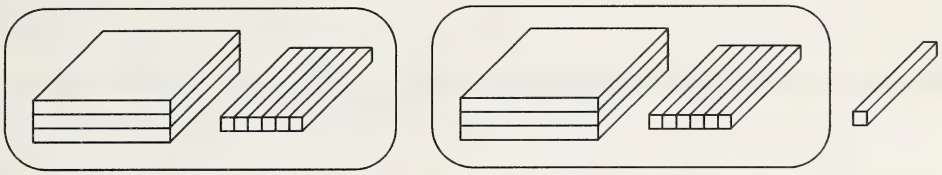
Step 3: You can divide 7 flats and 3 longs into 2 groups, but 1 flat and 1 long will be left over.



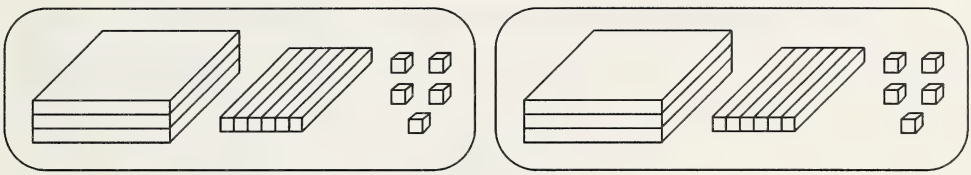
Step 4: Regroup the 1 flat into 10 longs.



Step 5: Divide the pieces into 2 groups.



Step 6: Regroup the long into 10 units and divide the pieces into 2 groups.



Step 7: Write a number sentence.

$0.73 \div 2 = 0.265$

2. Make models to show the following quotients. Record your answers.

a. $0.54 \div 9 =$ _____

b. $0.85 \div 2 =$ _____

c. $0.78 \div 3 =$ _____

Return to your Module Booklet.

# DIVIDING BY A DECIMAL NUMBER

## Exercise O

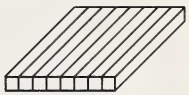
In the previous exercise you learned to divide by a whole number. Now you will learn to model division of decimal numbers with base 10 blocks.

**Example** $0.08 \div 0.04$

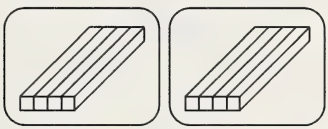
Step 1: Think about the meaning of division.

$0.08 \div 0.04$ can mean in 0.08 there are how many groups of 0.04.

Step 2: Form the number.



Step 3: Arrange the pieces into groups of 0.04. Two groups can be formed.



Step 4: Write a number sentence.

$0.08 \div 0.04 = 2$

1. Use base 10 blocks to solve this division problem.

   $0.6 \div 0.3 =$ _____

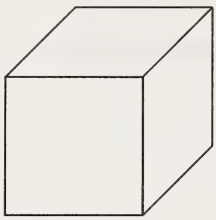
Sometimes regrouping is necessary.

**Example 1** $1 \div 0.1$

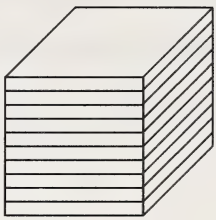
Step 1: Think about the meaning of division.

$1 \div 0.1$ can mean in 1 there are how many groups of 0.1.

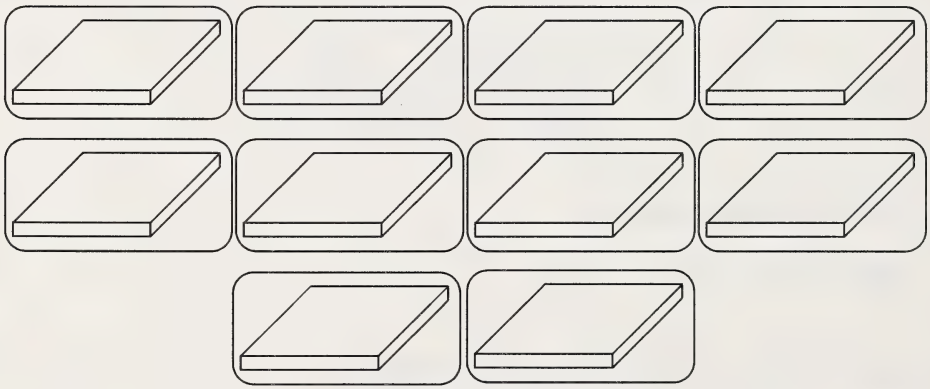
Step 2: Form the number.



Step 3: Regroup.



Step 4: Divide 1 into groups of 0.1. Ten groups can be formed.



Step 5: Write a number sentence.

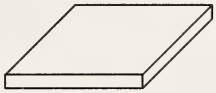
$1 \div 0.1 = 10$

**Example 2** $0.1 \div 0.05$

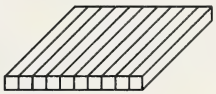
Step 1: Think about the meaning of division.

$0.1 \div 0.05$ can mean in 0.1 there are how many groups of 0.05?

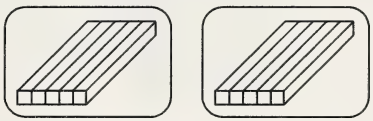
Step 2: Form the number.



Step 3: Regroup.



Step 4: Arrange the pieces into groups of 0.05. Two groups can be formed.



Step 5: Write a number sentence.

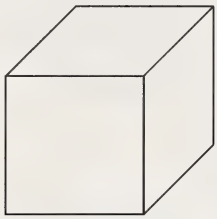
$0.1 \div 0.05 = 2$

**Example 3** $1 \div 0.2$

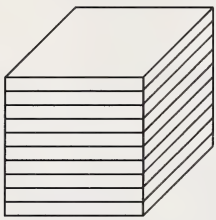
Step 1: Think about the meaning of division.

$1 \div 0.2$ can mean in 1 there are how many groups of 0.2.

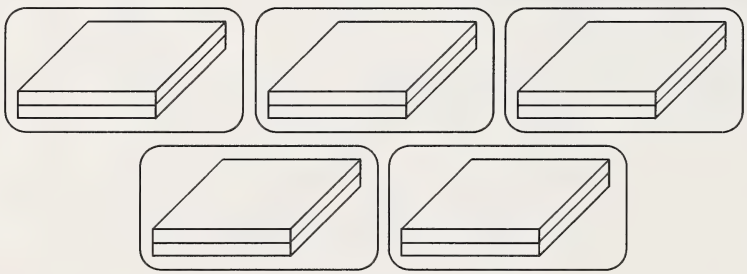
Step 2: Form the number.



Step 3: Regroup.



Step 4: Arrange in groups of 0.2. Five groups can be formed.



Step 5: Write a number sentence.

$1 \div 0.2 = 5$

2. Use base 10 blocks to solve this division problem.

$2 \div 0.4 =$ _____

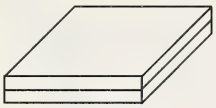
Sometimes you cannot form 1 whole group.

**Example 1** $0.2 \div 0.4$

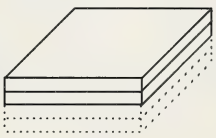
Step 1: Think about the meaning of division.

In 0.2 there are how many groups of 0.4?

Step 2: Form the number.



Step 3: Try to arrange the number in groups of 0.4. There is not one whole group.



$\frac{2}{4}$ or $\frac{1}{2}$

Step 4: Write a number sentence.

$0.2 \div 0.4 = \frac{1}{2}$

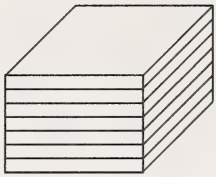
$\frac{1}{2} = \frac{5}{10} = 0.5$

**Example 2** $0.7 \div 0.5$

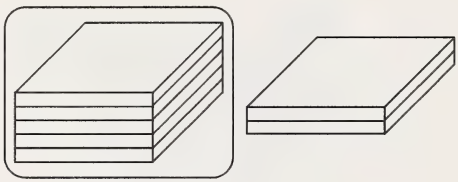
Step 1: Think about the meaning of division.

$0.7 \div 0.5$ can mean in 0.7 there are how many groups of 0.5

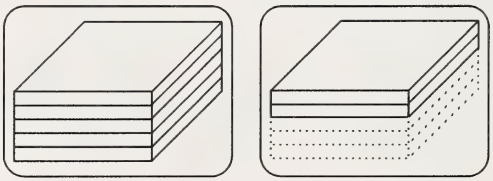
Step 2: Form the number.



Step 3: Arrange the pieces into groups of 0.5. There is 1 group and 2 flats left over.



Step 4: You can express the remaining flats as a fraction.



Step 5: Write a number sentence.

$$0.7 \div 0.5 = 1\frac{2}{5}$$

$$= 1.4$$

$$1\frac{2}{5} = 1\frac{4}{10}$$

$$= 1.4$$

3. Use base 10 blocks to solve these division problems.

   a. $0.8 \div 0.5 =$ _____

   b. $0.6 \div 0.4 =$ _____

Return to your Module Booklet.

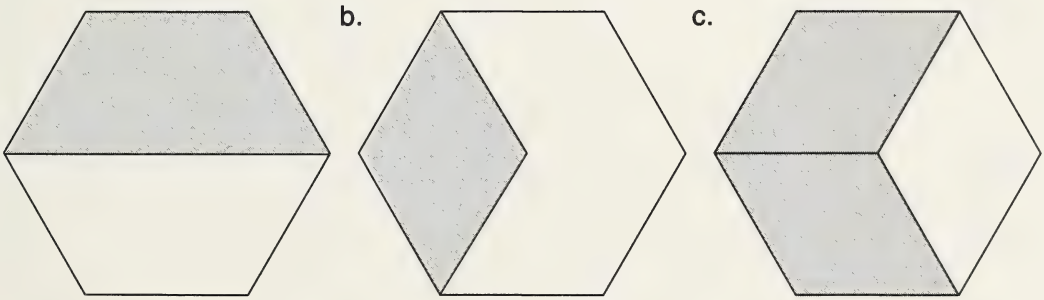
# Appendix

# SUGGESTED ANSWERS TO EXERCISE A

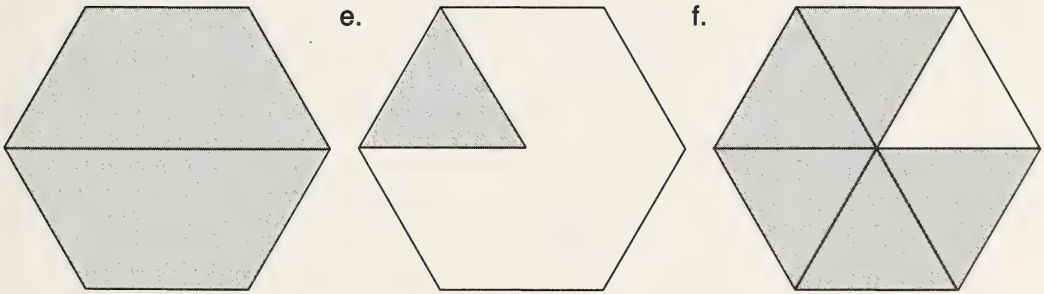
1. a. 3
   b. 2
   c. 3
   d. 2
   e. 6

2. a. trapezoid
   b. parallelogram
   c. hexagon
   d. triangle

3. a. b. c.



d. e. f.



4. a. 1
   b. 4
   c. $\frac{1}{4}$

5. a. 4
   b. 5
   c. $\frac{4}{5}$

6. a. 2
   b. 5
   c. $\frac{2}{5}$

7. a. 3
   b. 5
   c. $\frac{3}{5}$

8. a. $\frac{1}{2}$
   b. $\frac{1}{2}$
   c. $\frac{1}{3}$
   d. $\frac{2}{3}$
   e. $\frac{2}{3}$
   f. $\frac{1}{3}$
   g. $\frac{3}{6}$ or $\frac{1}{2}$
   h. $\frac{3}{6}$ or $\frac{1}{2}$

# SUGGESTED ANSWERS TO EXERCISE B

1. a. $\frac{3}{6}$

   b. $\frac{2}{4}$

   c. $\frac{1}{2}$

2. a. $\frac{3}{4}$

   b. $\frac{9}{12}$

   c. $\frac{3}{4} = \frac{9}{12}$

3. a. $\frac{4}{12}$

   b. $\frac{2}{6}$

   c. $\frac{4}{12} = \frac{2}{6}$

4. a. $\frac{1}{4}$

   b. $\frac{5}{6}$

   c. $\frac{2}{3}$

   d. $\frac{6}{7}$

   e. $\frac{3}{4}$

   f. $\frac{2}{5}$

5. The simpler forms have the lower whole numbers in the denominator.

# SUGGESTED ANSWERS TO EXERCISE C

1. a. $\frac{1}{2}$

   b. $1\frac{1}{2}$

   c. 3

   d. $3\frac{1}{2}$

2. a. $\frac{1}{3}$

   b. $\frac{2}{3}$

   c. 2

   d. $1\frac{1}{3}$

3. a. $1\frac{3}{10}$

   b. $\frac{13}{10}$

4. a. $1\frac{5}{8}$

   b. $\frac{13}{8}$

5. a. $1\frac{1}{4}$

   b. $\frac{5}{4}$

# SUGGESTED ANSWERS TO EXERCISE D

1. a. $\frac{2}{3}$.

   b. $\frac{4}{6}$.

   c. $\frac{7}{10}$.

   d. When fractions have the same denominator, the fraction with the larger numerator is greater.

2. a. $\frac{2}{3}$

   b. $\frac{1}{2}$.

   c. $\frac{4}{5}$.

   d. When fractions have the same numerator, the fraction with the larger denominator is greater.

3. a. $\frac{2}{3}$

   b. $\frac{5}{6}$

# SUGGESTED ANSWERS TO EXERCISE E

1. a. $\frac{2}{6}$

   b. $\frac{3}{6}$

   c. 5

   d. $\frac{5}{6}$

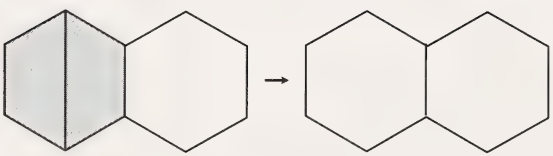
2. a. $\frac{3}{12}$

   b. $\frac{5}{12}$

   c. 8

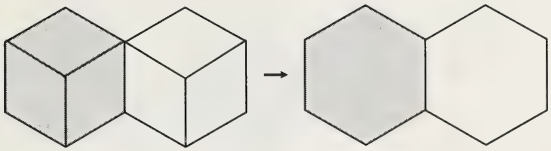
   d. $\frac{8}{12}$

   e. $\frac{2}{3}$

3. a. 

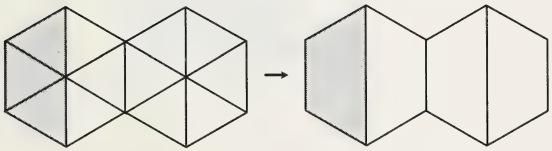
$$\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$$

$$= \frac{1}{2}$$

b. 

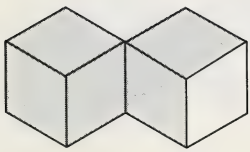
$$\frac{1}{6} + \frac{2}{6} = \frac{3}{6}$$

$$= \frac{1}{2}$$

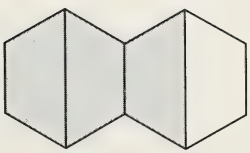
c. 

$$\frac{2}{12} + \frac{1}{12} = \frac{3}{12}$$

$$= \frac{1}{4}$$

d. 

$$\frac{2}{6} + \frac{3}{6} = \frac{5}{6}$$

e. 

$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$

4. a. $\frac{1}{2}$

   b. $\frac{1}{6}$

   c. 3, $\frac{3}{6}$

   d. 4, $\frac{4}{6}$

   e. $\frac{2}{3}$

5. a. $\frac{3}{4}$

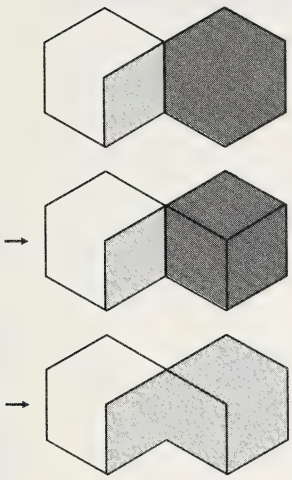
   b. $\frac{2}{6}$

   c. 9, $\frac{9}{12}$

   d. 4, $\frac{4}{12}$

   e. 13, $\frac{13}{12}$

6. a.



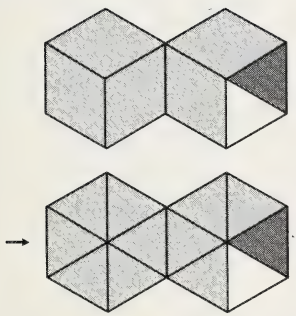
$$\frac{1}{6} + \frac{1}{2}$$

$$= \frac{1}{6} + \frac{3}{6}$$

$$= \frac{4}{6}$$

$$= \frac{2}{3}$$

b.

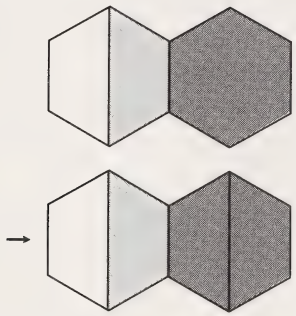


$$\frac{5}{6} + \frac{1}{12}$$

$$= \frac{10}{12} + \frac{1}{12}$$

$$= \frac{11}{12}$$

c.

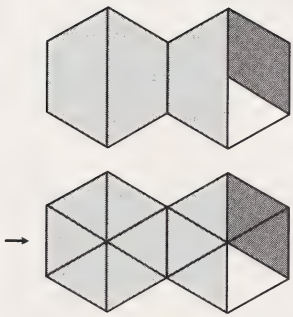


$$\frac{1}{4} + \frac{1}{2}$$

$$= \frac{1}{4} + \frac{2}{4}$$

$$= \frac{3}{4}$$

d.



$$\frac{3}{4} + \frac{1}{6}$$

$$= \frac{9}{12} + \frac{2}{12}$$

$$= \frac{11}{12}$$

# SUGGESTED ANSWERS TO EXERCISE F

1. a. $\frac{4}{6}$
   b. $\frac{3}{6}$
   c. 1, $\frac{1}{6}$

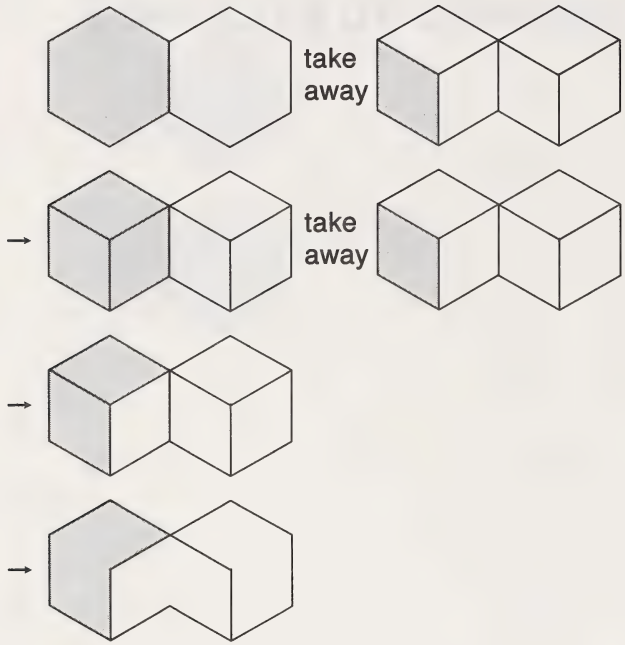
2. a. $\frac{5}{12}$
   b. $\frac{2}{12}$
   c. 3, $\frac{3}{12}$
   d. $\frac{1}{4}$

3. a. $\frac{7}{12}$
   b. $\frac{1}{4}$
   c. $\frac{1}{6}$
   d. $\frac{1}{2}$

4. a. $\frac{2}{6}$
   b. $\frac{1}{12}$
   c. 4, $\frac{4}{12}$
   d. 3, $\frac{3}{12}$
   e. $\frac{1}{4}$

5. a. $\frac{2}{4}$
   b. $\frac{2}{6}$
   c. 3, $\frac{3}{6}$
   d. 1, $\frac{1}{6}$

6. a.



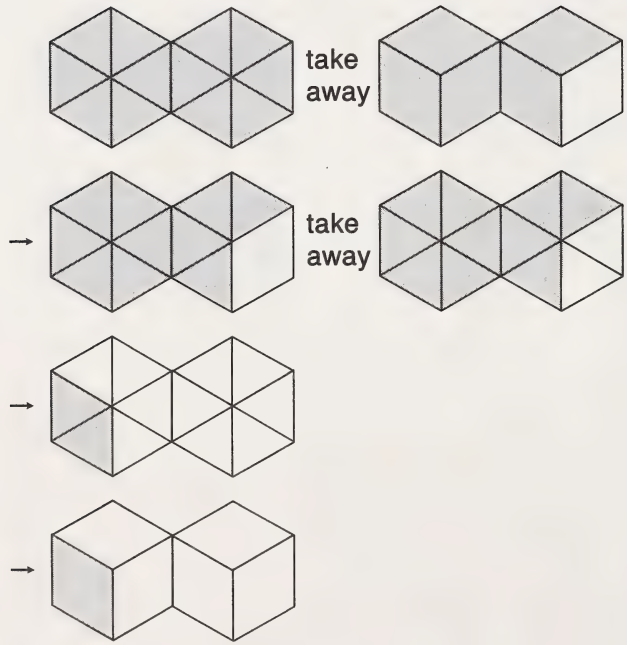

$$\frac{1}{2} - \frac{1}{6}$$

$$= \frac{3}{6} - \frac{1}{6}$$

$$= \frac{2}{6}$$

$$= \frac{1}{3}$$

b.



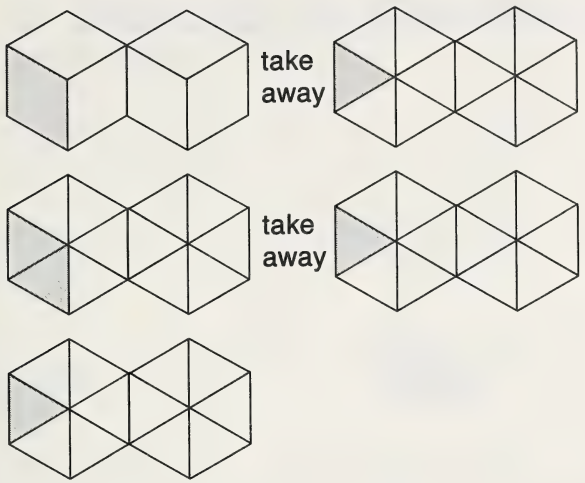

$$\frac{12}{12} - \frac{5}{6}$$

$$= \frac{12}{12} - \frac{10}{12}$$

$$= \frac{2}{12}$$

$$= \frac{1}{6}$$

c.

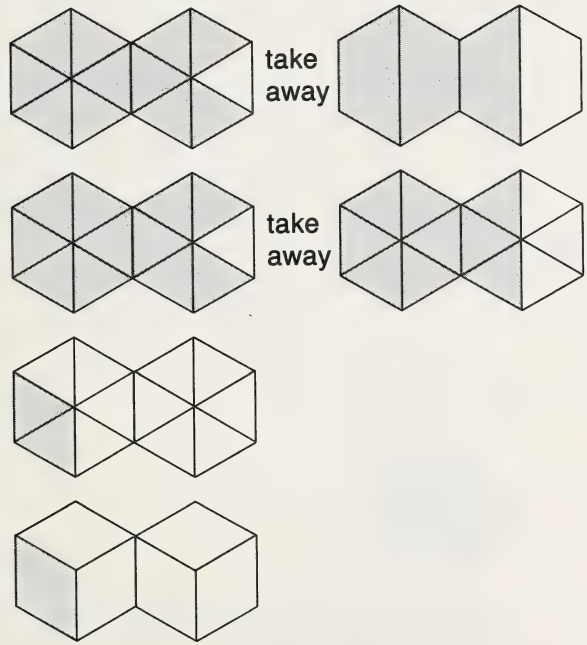



$$\frac{1}{6} - \frac{1}{12}$$

$$= \frac{2}{12} - \frac{1}{12}$$

$$= \frac{1}{12}$$

d.




$$\frac{11}{12} - \frac{3}{4}$$

$$= \frac{11}{12} - \frac{9}{12}$$

$$= \frac{2}{12}$$

$$= \frac{1}{6}$$

# SUGGESTED ANSWERS TO EXERCISE G

1. a. $\frac{2}{12}$ or $\frac{1}{6}$

   b. $\frac{15}{6}$ or $\frac{5}{2}$ or $2\frac{1}{2}$

   c. $\frac{12}{4}$ or 3

   d. $\frac{10}{12}$ or $\frac{5}{6}$

2. a. six

   b. $\frac{1}{6}$

   c. $\frac{1}{6}$

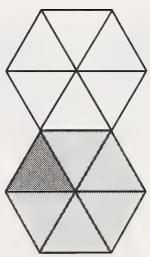
3. a. $\frac{1}{6}$

   b. $\frac{1}{6}$

4. a. One of six equal parts of one-half.

   b.

One hexagon is $\frac{1}{2}$ of one whole.

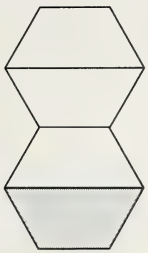


One triangle is $\frac{1}{6}$ of one hexagon, and $\frac{1}{12}$ of one whole.

   c. $\frac{1}{12}$

5. a. 2 of 3 equal parts of $\frac{1}{4}$

b.



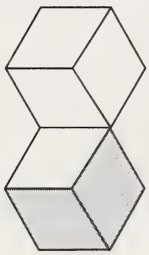
One trapezoid is $\frac{1}{4}$ of a whole.

Two triangles are $\frac{2}{3}$ of one trapezoid, and $\frac{2}{12}$ of a whole. Two triangles can be exchanged for one parallelogram. One parallelogram is $\frac{1}{6}$ of a whole.

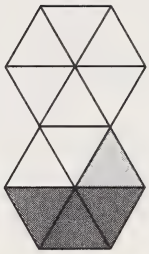
c. So $\frac{2}{12}$ or $\frac{1}{6}$

6. a. 3 of 4 equal parts of $\frac{2}{6}$

b.



Two parallelograms are $\frac{2}{6}$ of the whole.



Three triangles are $\frac{3}{4}$ of two parallelograms, and $\frac{3}{12}$ of the whole. Three triangles can be traded for one trapezoid. One trapezoid is $\frac{1}{4}$ of the whole.

c. So $\frac{3}{4} \times \frac{2}{6} = \frac{3}{12}$

$= \frac{1}{4}$

7. a. $\frac{1}{12}$

   b. $\frac{1}{4}$

   c. $\frac{1}{12}$

   d. $\frac{2}{6}$ or $\frac{1}{3}$

   e. $\frac{5}{12}$

   f. $\frac{2}{4} = \frac{1}{2}$

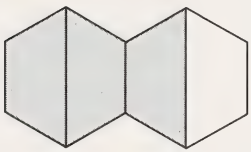
# SUGGESTED ANSWERS TO EXERCISE H

1. a. $\frac{1}{12}$

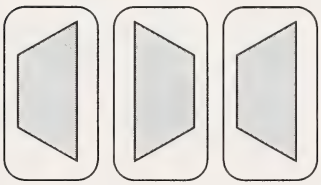
   b. $\frac{1}{6}$

   c. $\frac{5}{12}$

2. a. $\frac{3}{4} \div \frac{1}{4}$ means in $\frac{3}{4}$ there are how many groups of $\frac{1}{4}$.



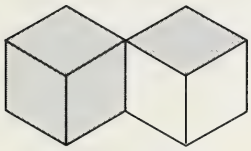
divided by $\frac{1}{4}$ is



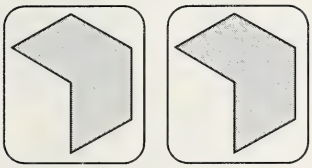
There are 3 groups.

So $\frac{3}{4} \div \frac{1}{4} = 3$

b. $\frac{4}{6} \div \frac{2}{6}$ means in $\frac{4}{6}$ there are how many groups of $\frac{2}{6}$.



divided by $\frac{2}{6}$ is



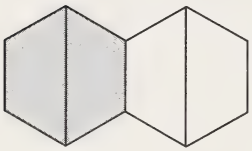
There are 2 groups.

So $\frac{4}{6} \div \frac{2}{6} = 2$

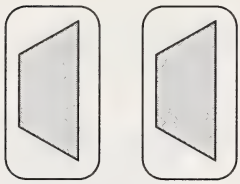
c. $\frac{1}{2} \div \frac{1}{4}$ means in $\frac{1}{2}$ there are how many groups of $\frac{1}{4}$.

You need to trade $\frac{1}{2}$ for $\frac{2}{4}$.

$\frac{2}{4} \div \frac{1}{4}$ means in $\frac{2}{4}$ there are how many groups of $\frac{1}{4}$.



divided by $\frac{1}{4}$ is



There are 2 groups.

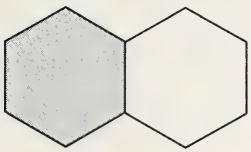
So $\frac{1}{2} \div \frac{1}{4} = \frac{2}{4} \div \frac{1}{4}$

$= 2$

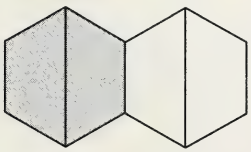
3. a. $\frac{1}{2} \div \frac{3}{4}$ means in $\frac{1}{2}$ there are how many groups of $\frac{3}{4}$.

You need to trade $\frac{1}{2}$ for $\frac{2}{4}$.

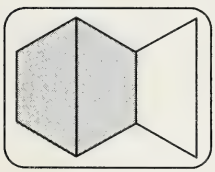
$\frac{2}{4} \div \frac{3}{4}$ means in $\frac{2}{4}$ there are how many groups of $\frac{3}{4}$.



divided by $\frac{3}{4}$ is the same as



divided by $\frac{3}{4}$, or



There is $\frac{2}{3}$ of 1 group.

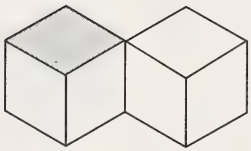
So $\frac{1}{2} \div \frac{3}{4} = \frac{2}{4} \div \frac{3}{4}$

$= \frac{2}{3}$

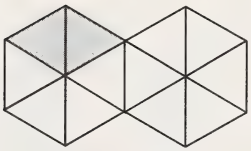
b. $\frac{1}{6} \div \frac{1}{4}$ means in $\frac{1}{6}$ there are how many groups of $\frac{1}{4}$.

You need to trade $\frac{1}{6}$ for $\frac{2}{12}$ and $\frac{1}{4}$ for $\frac{3}{12}$.

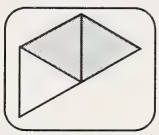
$\frac{2}{12} \div \frac{3}{12}$ means in $\frac{2}{12}$ there are how many groups of $\frac{3}{12}$.



divided by $\frac{1}{4}$ is the same as



divided by $\frac{3}{12}$, or



There is $\frac{2}{3}$ of a group.

So $\frac{1}{6} \div \frac{1}{4}$

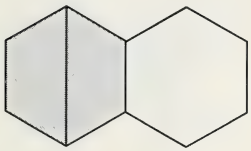
$= \frac{2}{12} \div \frac{3}{12}$

$= \frac{2}{3}$

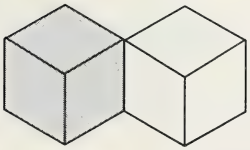
c. $\frac{1}{2} \div \frac{5}{6}$ means in $\frac{1}{2}$ there are how many groups of $\frac{5}{6}$.

Trade $\frac{1}{2}$ for $\frac{3}{6}$.

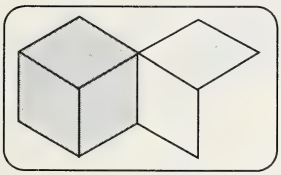
$\frac{3}{6} \div \frac{5}{6}$ means in $\frac{3}{6}$ there are how many groups of $\frac{5}{6}$.



divided by $\frac{5}{6}$ is the same as



divided by $\frac{5}{6}$, or



There is $\frac{3}{5}$ of a group.

So $\frac{1}{2} \div \frac{5}{6}$

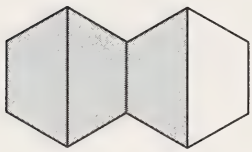
$= \frac{3}{6} \div \frac{5}{6}$

$= \frac{3}{5}$

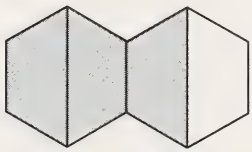
4 a. $\frac{3}{4} \div \frac{1}{2}$ means in $\frac{3}{4}$ there are how many groups of $\frac{1}{2}$.

Trade $\frac{1}{2}$ for $\frac{2}{4}$.

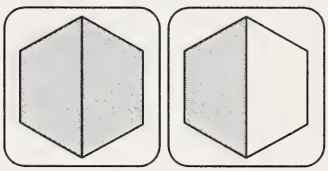
$\frac{3}{4} \div \frac{2}{4}$ means in $\frac{3}{4}$ there are how many groups of $\frac{2}{4}$.



divided by $\frac{1}{2}$ is the same as



divided by $\frac{2}{4}$, or



There is $1\frac{1}{2}$ groups.

So $\frac{3}{4} \div \frac{1}{2}$

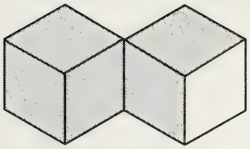
$= \frac{3}{4} \div \frac{2}{4}$

$= 1\frac{1}{2}$

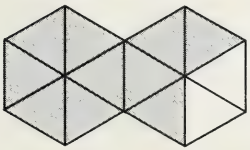
b. $\frac{5}{6} \div \frac{1}{4}$ means in $\frac{5}{6}$ there are how many groups of $\frac{1}{4}$.

Trade $\frac{5}{6}$ for $\frac{10}{12}$. Trade $\frac{1}{4}$ for $\frac{3}{12}$.

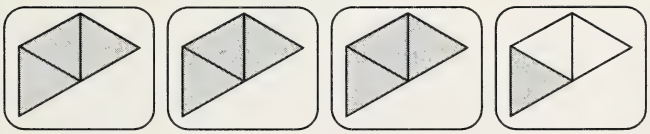
$\frac{10}{12} \div \frac{3}{12}$ means in $\frac{10}{12}$ there are how many groups of $\frac{3}{12}$.



divided by $\frac{1}{4}$ is the same as



divided by $\frac{3}{12}$, or



There is $3\frac{1}{3}$ groups.

So $\frac{5}{6} \div \frac{1}{4}$

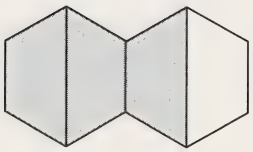
$= \frac{10}{12} \div \frac{3}{12}$

$= 3\frac{1}{3}$

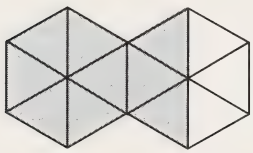
c. $\frac{3}{4} \div \frac{5}{12}$ means in $\frac{3}{4}$ there are how many groups of $\frac{5}{12}$.

Trade $\frac{3}{4}$ for $\frac{9}{12}$.

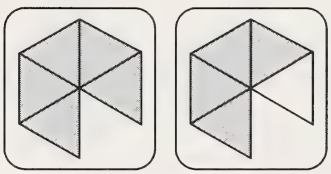
$\frac{9}{12} \div \frac{5}{12}$ means in $\frac{9}{12}$ there are how many groups of $\frac{5}{12}$.



divided by $\frac{5}{12}$ is the same as



divided by $\frac{5}{12}$, or



There is $1\frac{4}{5}$ groups.

So $\frac{3}{4} \div \frac{5}{12}$

$= \frac{9}{12} \div \frac{5}{12}$

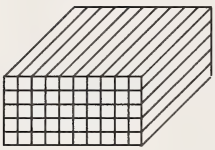
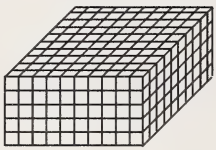
$= 1\frac{4}{5}$

# SUGGESTED ANSWERS TO EXERCISE I

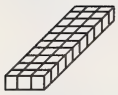
1. a. 10
   b. 100
   c. 1000
   d. 10
   e. 100
   f. 10

2. a. 0.482
   b. 1.734
   c. 2.206
   d. 1.043
   e. 1.111
   f. 0.404

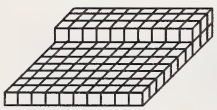
# SUGGESTED ANSWERS TO EXERCISE J

1. a.  

0.50 0.500

b. 

0.030

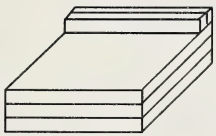
c. 

0.130

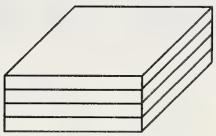
2. a. $0.8 > 0.5$

b. $0.32 > 0.3$

3. a.



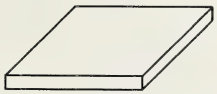
0.32



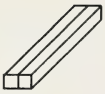
0.4

$0.4 > 0.32$

b.



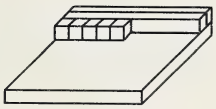
0.1



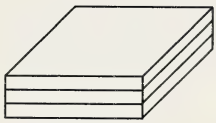
0.02

$0.1 > 0.02$

c.



0.125

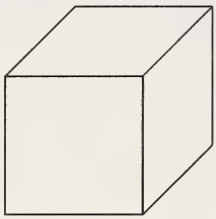
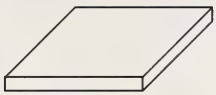
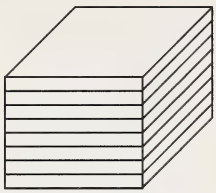


0.3

$0.3 > 0.125$

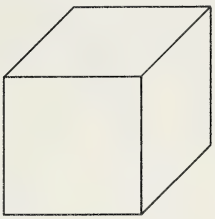
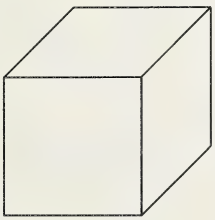
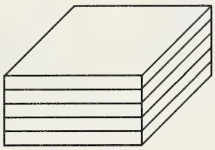
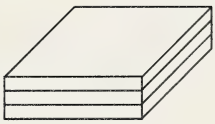
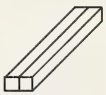
# SUGGESTED ANSWERS TO EXERCISE K

1. a.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
|  |   | | |

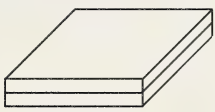
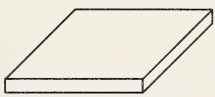
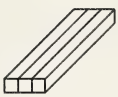
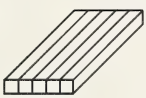
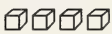
Number Sentence 1.1 + 0.8 = 1.9

b.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
|   |   |  | |

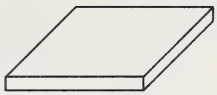
Number Sentence 1.5 + 1.32 = 2.82

c.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| |   |   |  |

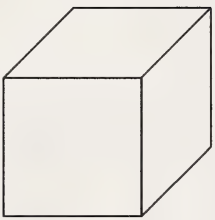
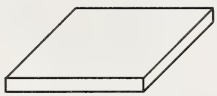
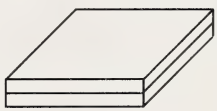
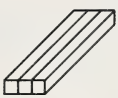
Number Sentence 0.234 + 0.153 = 0.387

d.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| |  | | |

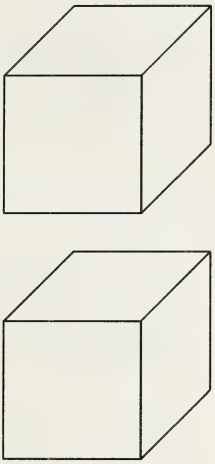
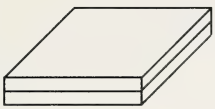
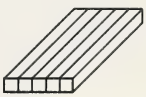
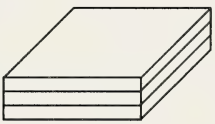
Number Sentence 0.012 + 0.101 = 0.113

e.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
|  |   |  | |

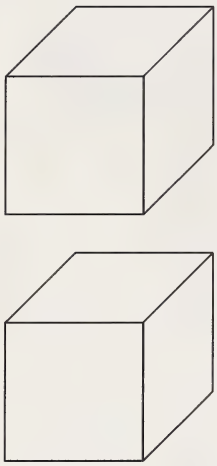
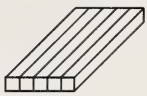
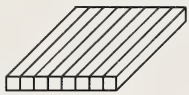
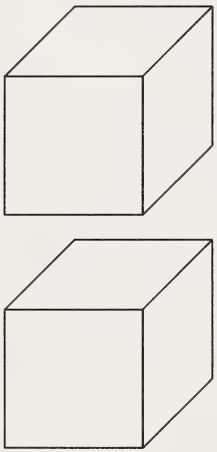
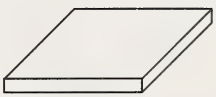
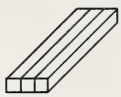
Number Sentence 0.1 + 1.23 = 1.33

f.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
|  |  |  | |
|  |  | | |

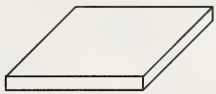
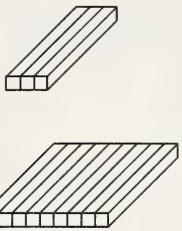
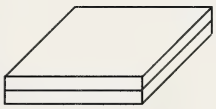
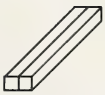
Number Sentence 1.25 + 1.302 = 2.552

2. a.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| Step 1: Form the numbers.  | |   | |
| Step 2: Combine from right to left. Trade 10 longs for 1 flat.  |  |  | |

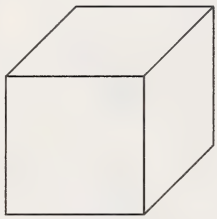
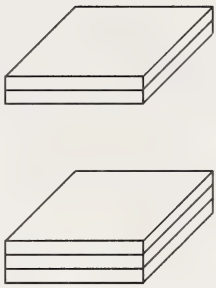
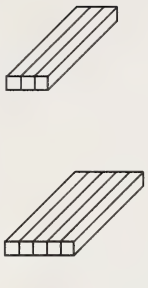
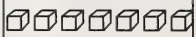
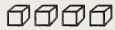
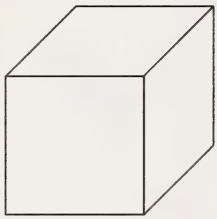
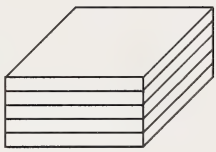
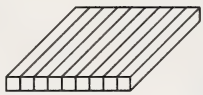
Number Sentence 1.05 + 1.08 = 2.13

b.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| Step 1: Form the numbers. |  |  | |
| Step 2: Combine from right to left. Trade 10 longs for 1 flat. |  |  | |

Number Sentence 0.132 + 0.09 = 0.222

c.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
|  |  |  |  |
| |  |  |  |
|  |  |  | |

Step 1: Form the numbers.

Step 2: Combine from right to left. Trade 10 units for 1 long.

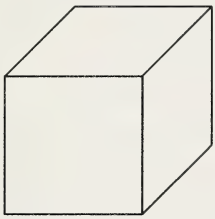
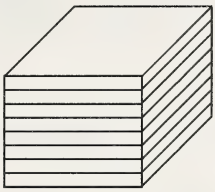
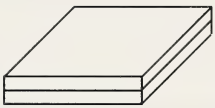
Number Sentence 1.237 + 0.354 = 1.591

# SUGGESTED ANSWERS TO EXERCISE L

1. a.

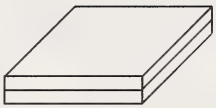
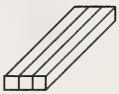
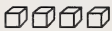
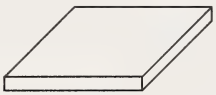
Step 1: Form the first number.

Step 2: Take away the required pieces.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
|  |  | | |
| |  | | |

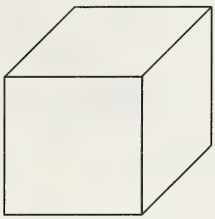
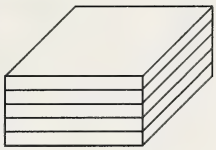
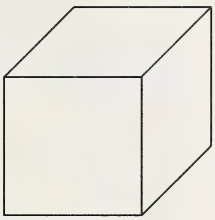
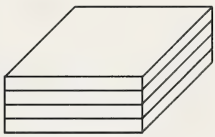
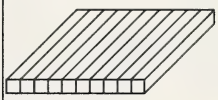
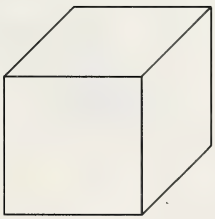
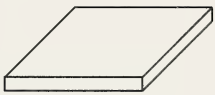
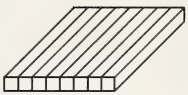
Number Sentence 1.8 – 1.6 = 0.2

b.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| Step 1: Form the first number. |  |  |  |
| Step 2: Take away the required pieces. Work from right to left. |  | | |

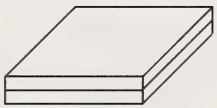
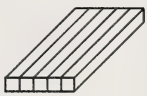
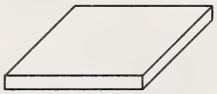
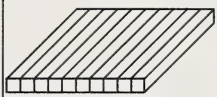
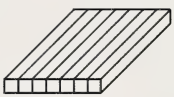
Number Sentence 0.234 – 0.132 = 0.102

2. a.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| Step 1: Form the first number.  |  | | |
| Step 2: Trade 1 flat for 10 longs.  |  |  | |
| Step 3: Take away the required pieces. Work from right to left.  |  |  | |

Number Sentence 1.50 – 0.32 = 1.18

b.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| |  |  | |
| |  |  | |
| | |  | |

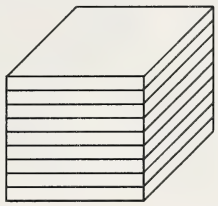
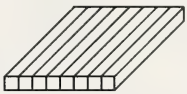
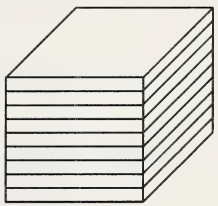
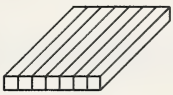
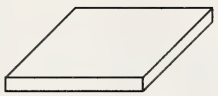
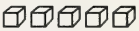
Step 1: Form the first number.

Step 2: Trade 1 flat for 10 longs.

Step 3: Take away the required pieces. Work from right to left.

Number Sentence 0.25 – 0.18 = 0.07

c.

| ones | tenths | hundredths | thousandths |
|---|---|---|---|
| |  |  | |
| |  |  | |
| |  | |  |

Step 1: Form the first number.

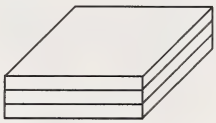
Step 2: Trade 1 long for 10 units.

Step 3: Take away the required pieces. Work from right to left.

Number Sentence 0.981 – 0.876 = 0.105

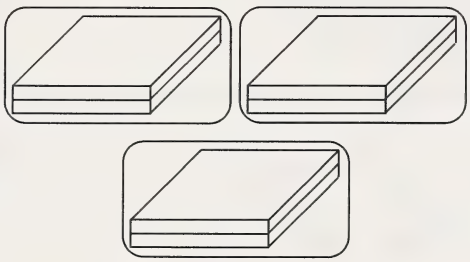
# SUGGESTED ANSWERS TO EXERCISE M

1. a. 1 × 0.3 means 1 group of 0.3 ← Read 3 tenths.

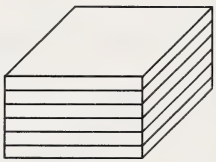


1 × 0.3 = 0.3

b. 3 × 0.2 means 3 groups of 0.2 ← Read 2 tenths.

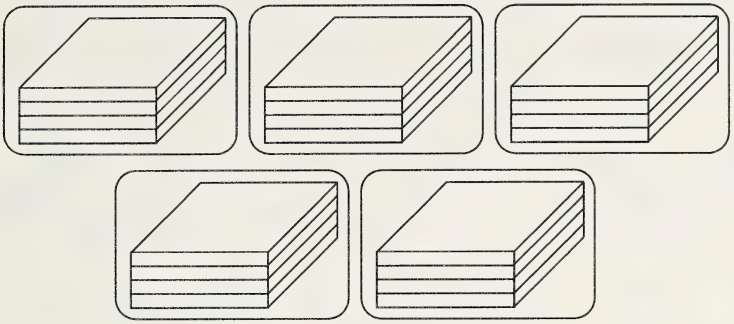


or

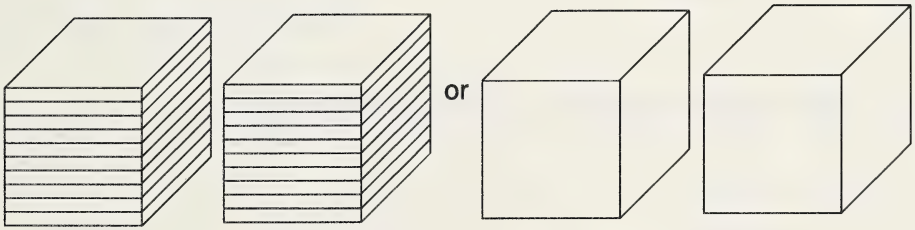


3 × 0.2 = 0.6

c. 5 × 0.4 means 5 groups of 0.4 ← Read 4 tenths.



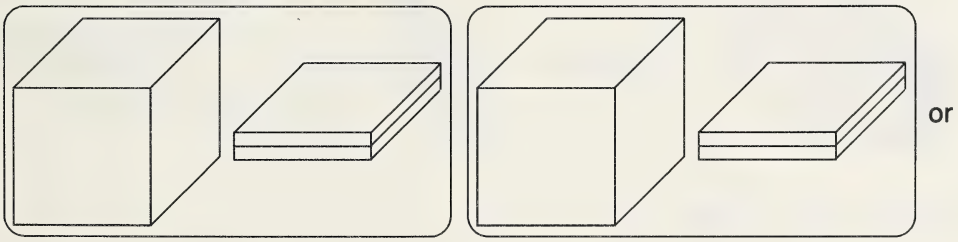
or



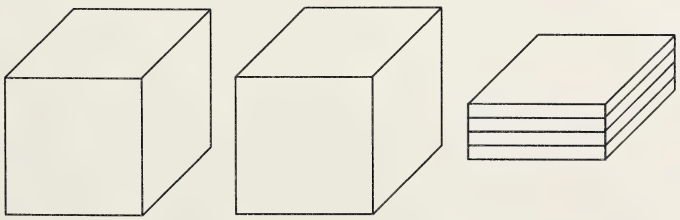
or

5 × 0.4 = 2.0 = 2

d. 2 × 1.2 means 2 groups of 1.2 ← Read 1 and 2 tenths.

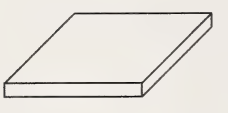


or

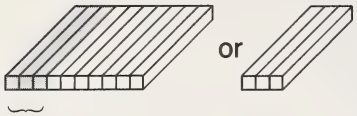


2 × 1.2 = 2.4

2. a. 0.3 × 0.1 means 0.3 of 0.1 ← Read 3 tenths of 1 tenth.



all of 0.1

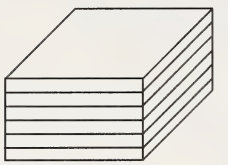


or

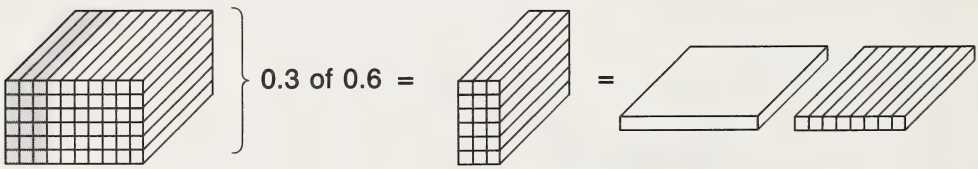
0.3 of 0.01 or 0.03

So 0.3 × 0.1 = 0.03

b. 0.3 × 0.06 means 0.3 of 0.06 ← Read 3 tenths of 6 tenths.



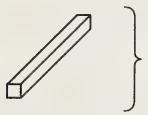
all of 0.6

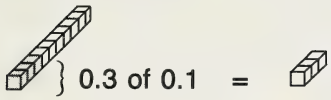


0.3 of 0.6 = =

So 0.3 × 0.6 = 0.18

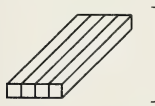
c. 0.3 × 0.01 means 0.3 of 0.01 ← Read 3 tenths of 1 hundredth.

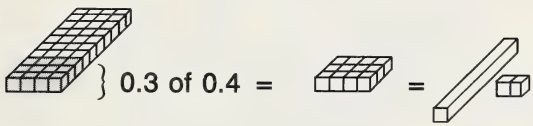

all of 0.01


0.3 of 0.1 =

So 0.3 × 0.01 = 0.04

d. 0.3 × 0.04 means 0.3 of 0.04

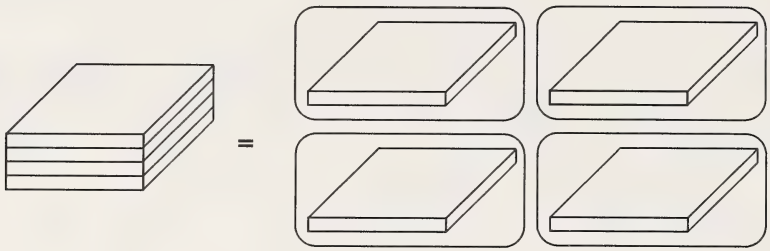

all of 0.04


0.3 of 0.4 = =

So 0.3 × 0.04 = 0.012

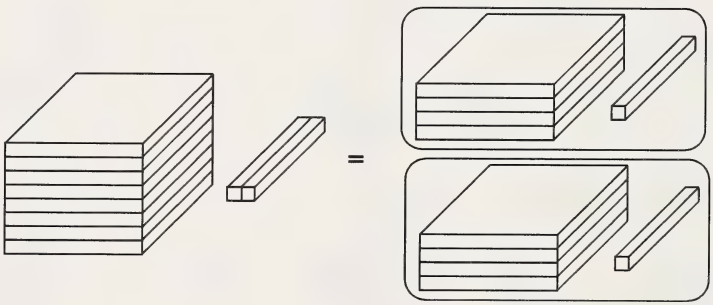
# SUGGESTED ANSWERS TO EXERCISE N

1. a. 0.4 ÷ 4 means in 0.4 there are 4 groups of how many.



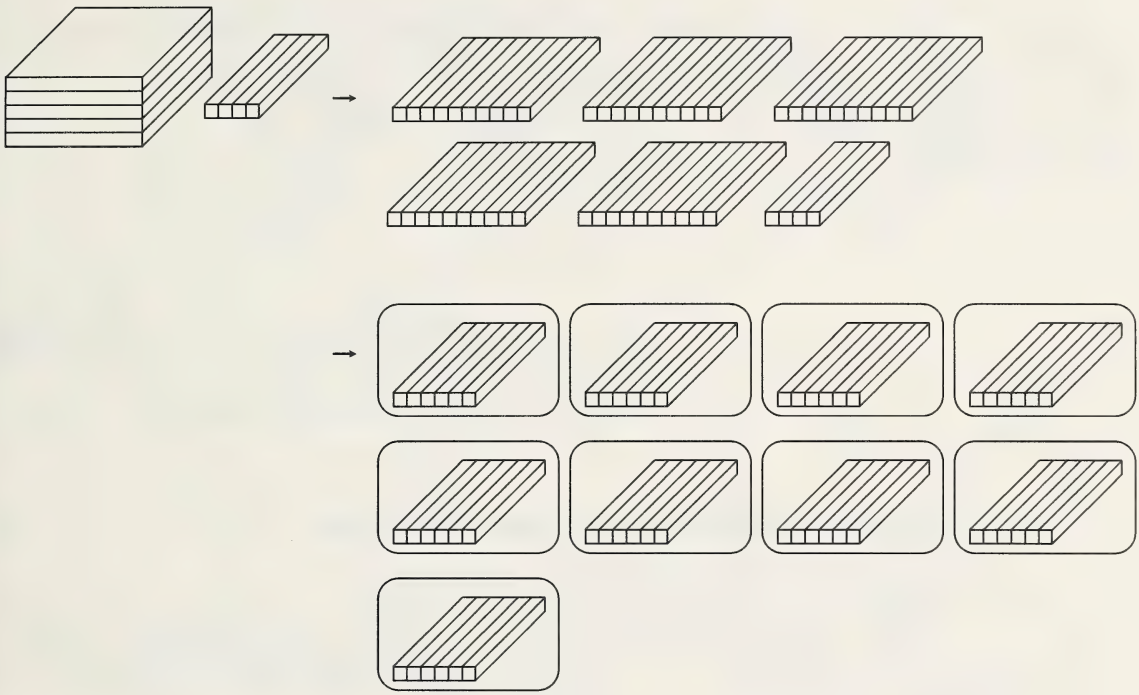
0.4 ÷ 4 = 0.1

b. 0.82 ÷ 2 means in 0.82 there are 2 groups of how many.



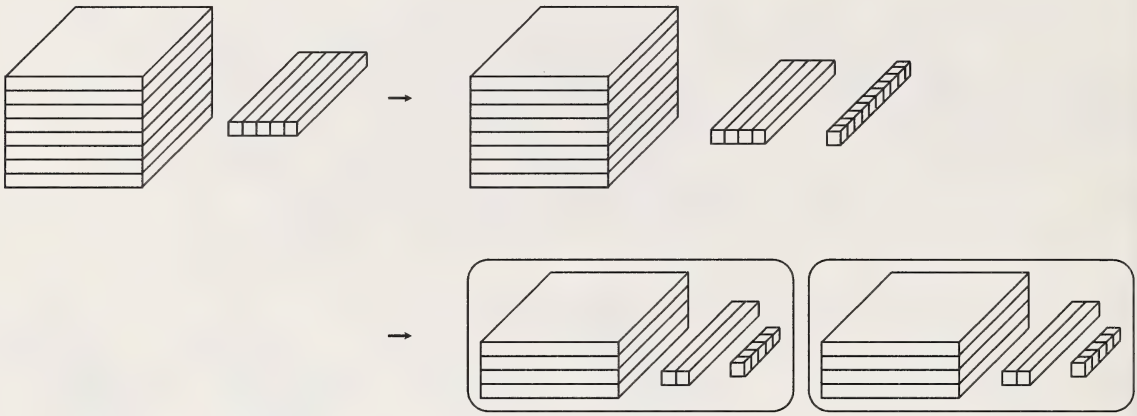
0.82 ÷ 2 = 0.41

2. a. 0.54 ÷ 9 means in 0.54 there are 9 groups of how many.



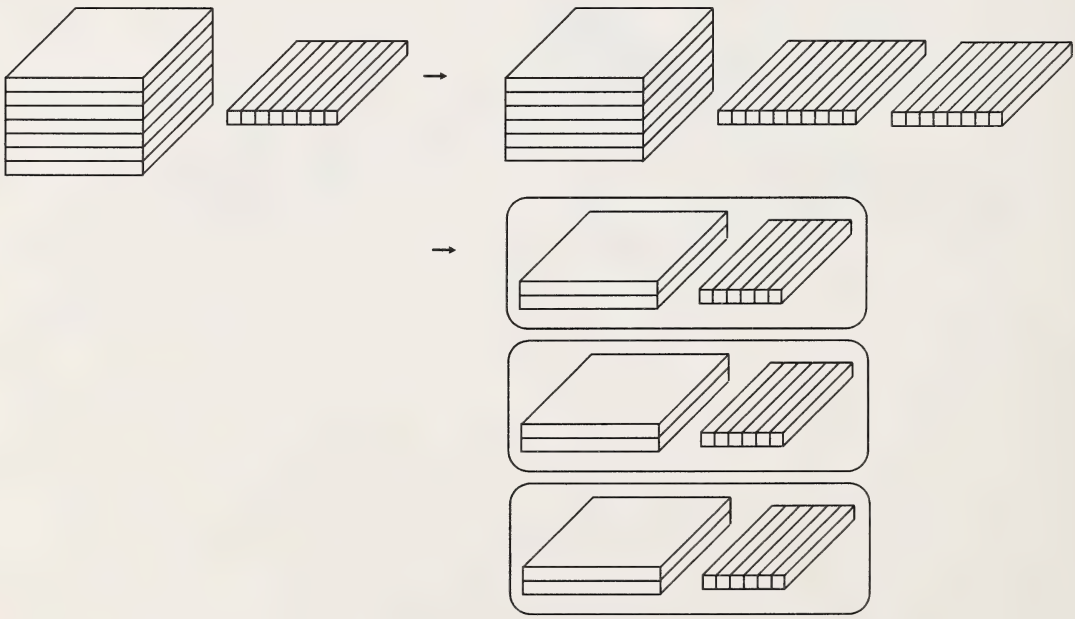
0.54 ÷ 9 = 0.06

b. 0.85 ÷ 2 means in 0.85 there are 2 groups of how many.



0.85 ÷ 2 = 0.425

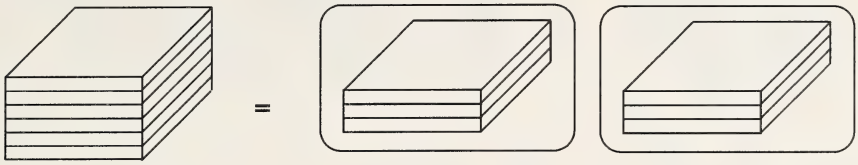
c. 0.78 ÷ 3 means in 0.78 there are 3 groups of how many.



0.78 ÷ 3 = 0.26

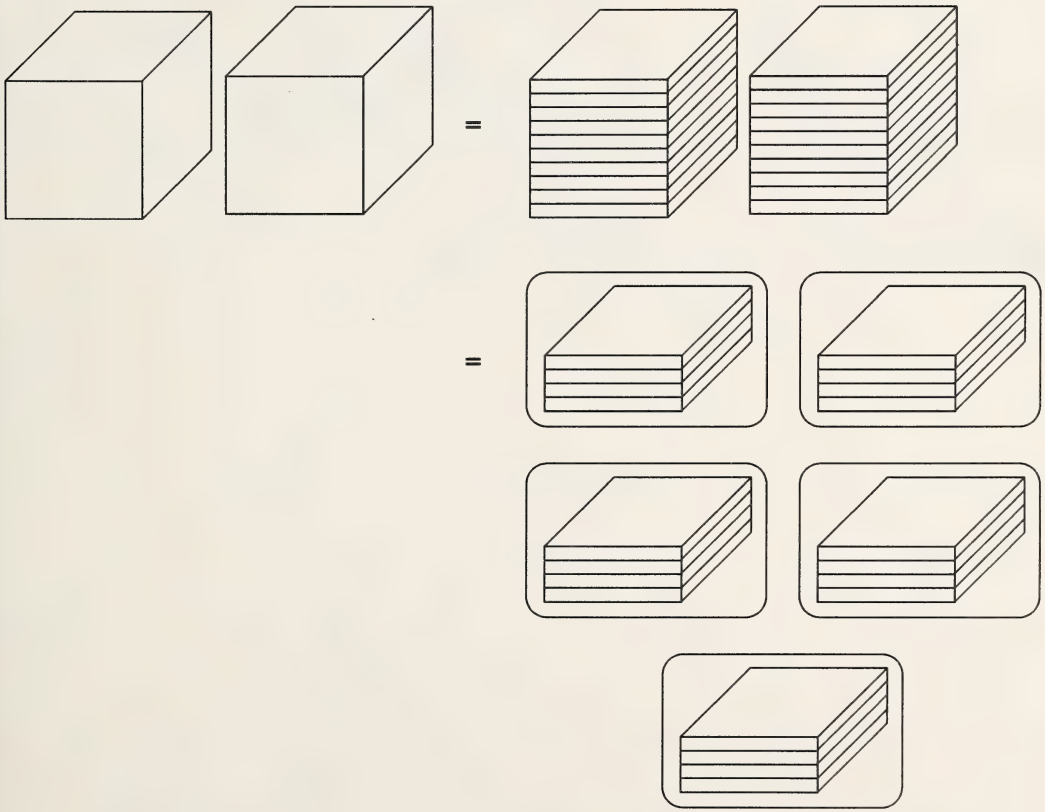
# SUGGESTED ANSWERS TO EXERCISE O

1. a. 0.6 ÷ 0.3 means in 0.6 there are how many groups of 0.3.



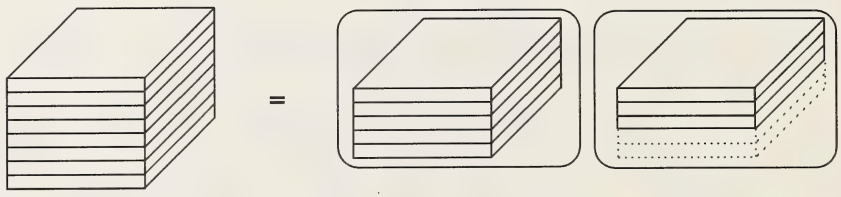
0.6 ÷ 0.3 = 2

2. a. 2 ÷ 0.4 means in 2 there are how many groups of 0.4.



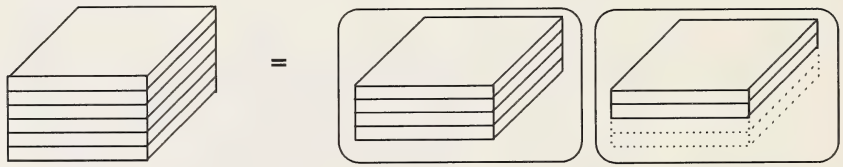
2 ÷ 0.4 = 5

3. a. $0.8 \div 0.5$ means in 0.8 there are how many groups of 0.5.

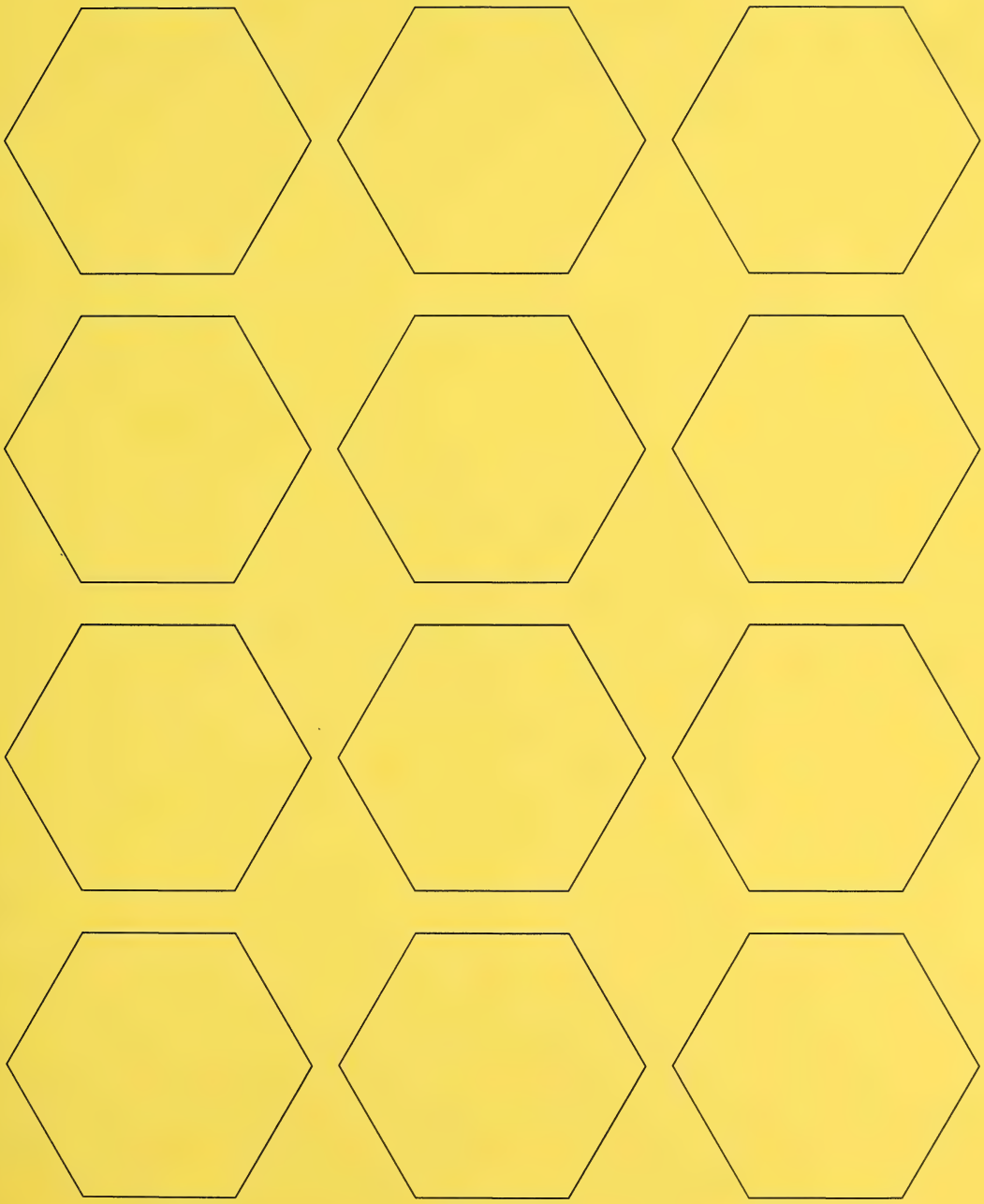


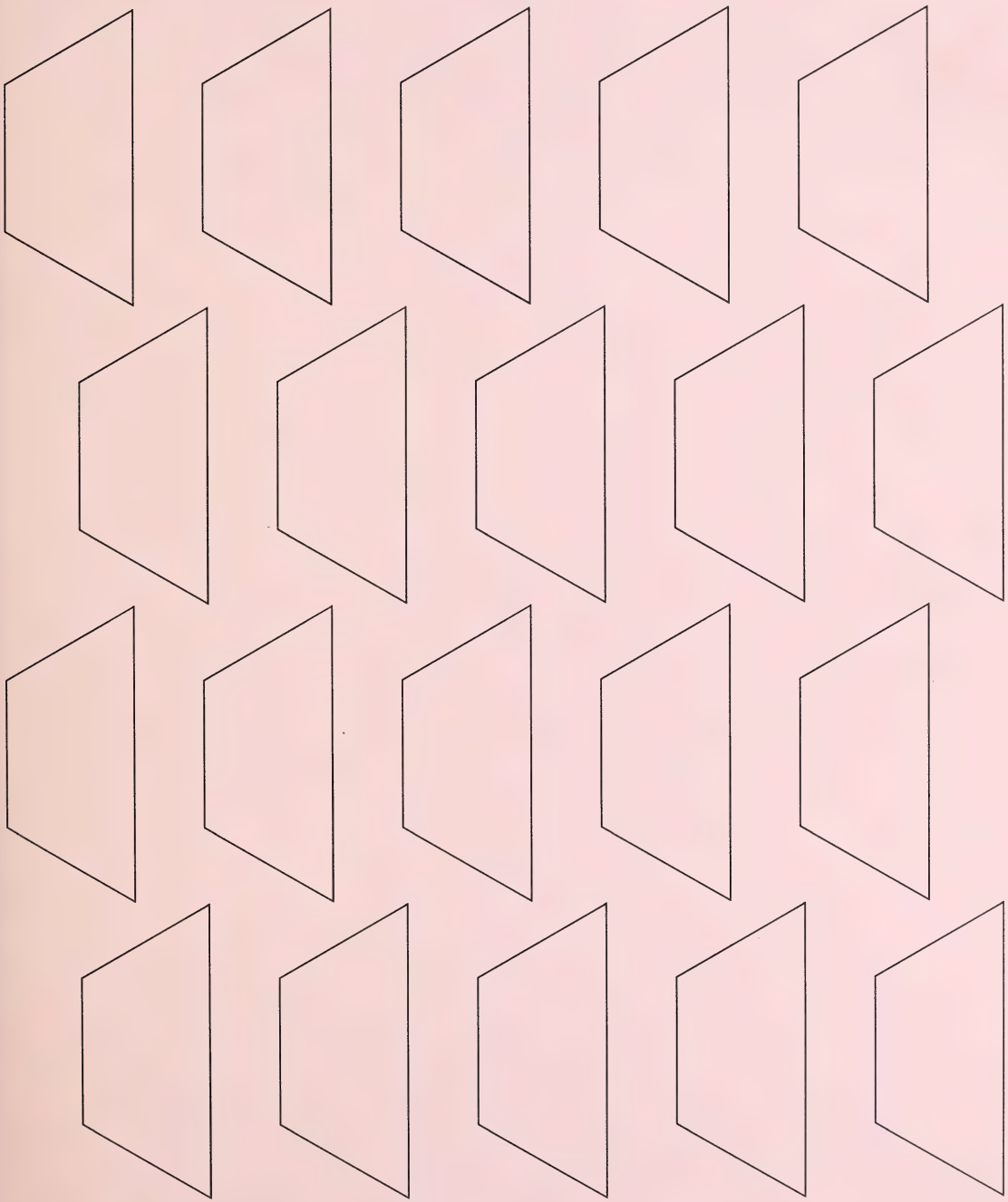
So $0.8 \div 0.5 = 1\frac{3}{5}$ or $1\frac{6}{10}$ or 1.6

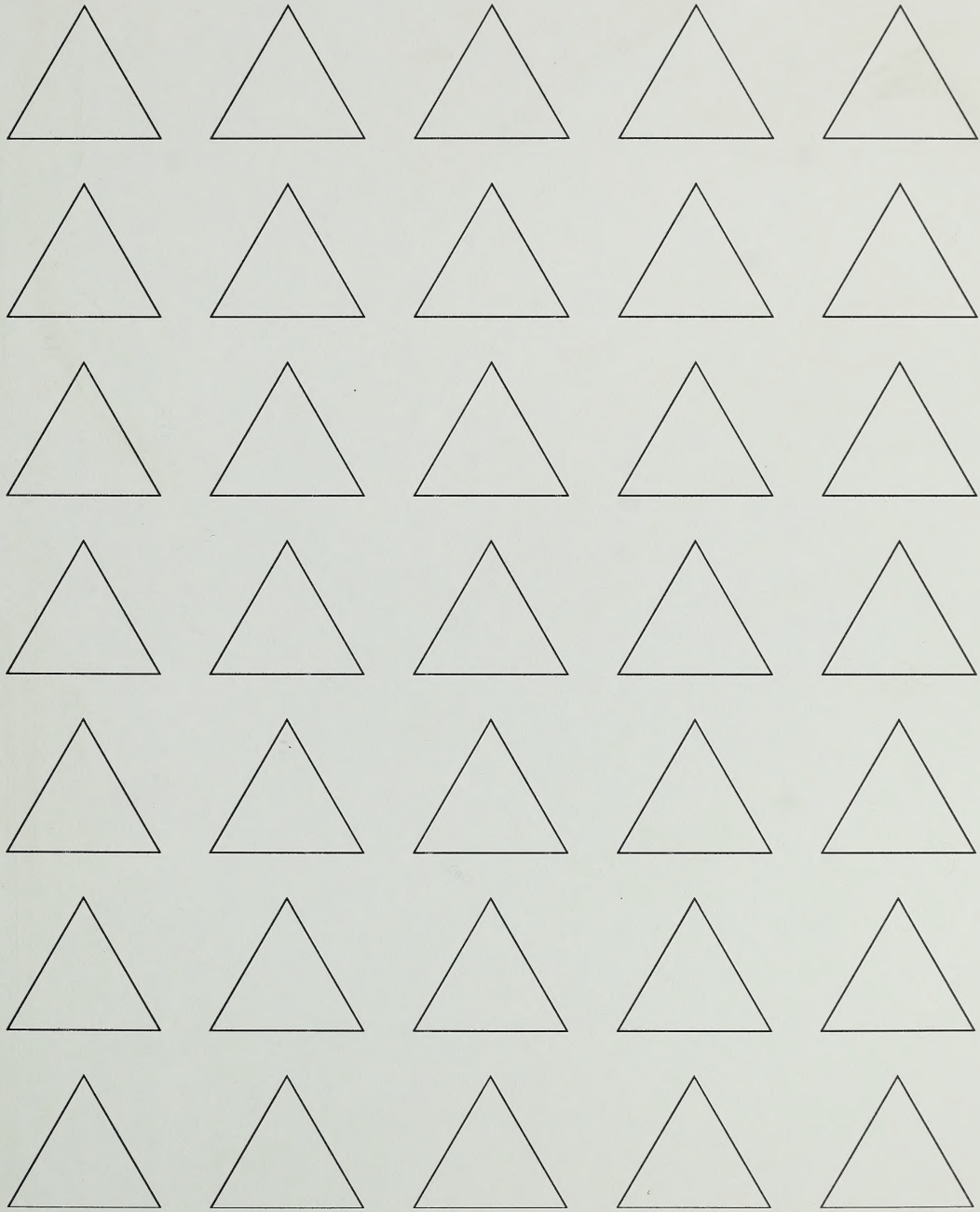
b. $0.6 \div 0.4$ means in 0.6 there are how many groups of 0.4.



$0.6 \div 0.4 = 1\frac{2}{4}$ or $1\frac{1}{2}$ or $1\frac{5}{10}$ or 1.5







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